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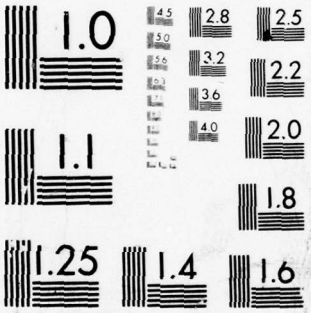

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LEVEL III

BS. 12

VOLUME III

Supporting Data FY 1980

Budget Estimate

Submitted to CONGRESS January 1979

Descriptive Summaries Of The

RESEARCH DEVELOPMENT TEST & EVALUATION

Army Appropriation FY 1980

DEPARTMENT OF THE ARMY DEPUTY CHIEF OF STAFF
FOR RESEARCH DEVELOPMENT AND ACQUISITION
RDTE PROGRAMS AND BUDGET DIVISION

UNCLASSIFIED

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VOLUME III

DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS

OF THE

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY PROGRAM

FY 1980

JANUARY 1979

Department of the Army
Deputy Chief of Staff for Research, Development, and Acquisition

FOREWORD

These volumes have been prepared to provide information on the US Army Research, Development, Test, and Evaluation Program for Congressional Committees during the Fiscal Year 1980 hearings. This information is in addition to the testimony given by US Army witnesses.

These volumes contain a descriptive summary for each program element to be financed during FY 1980. Descriptive Summaries for projects within the program elements to be financed during FY 1980 for $5.0 million or more appear immediately following the applicable program element. Where there are several items under development within a project, a separate summary has been provided for each item that exceeds $5.0 million during FY 1980. A Test and Evaluation Section is provided for all major weapon systems.

There are twenty-four major weapon systems descriptive summaries appearing in Volumes II and III. Major weapon systems are identified by an asterisk in the Table of Contents. The formats and contents of these volumes are in accordance with guidelines and requirements of the Congressional Committees insofar as possible. Information previously provided in the SAC Data Book is consolidated into these volumes. The SAC Data Book information appears at the beginning of each program element descriptive summary.

A direct comparison of FY 1978, FY 1979, FY 1980, and FY 1981 data in this Program Element Listing with data shown in the Program Element Listing dated January 1978 will reveal significant differences. Many of the differences are attributable to the following factors:

a. Restructuring of the FY 1978 and FY 1979 programs for comparability to the FY 1980 program structure.

b. Reclassification to provide greater visibility and contribute to the effective management of the RDTE program such as the following:

(1) RDTE Headquarters Management.

(2) Further extension of the Single Program Element Funding Concept.

(3) Restructuring of Exploratory Development personnel RDTE programs.

The funding information used in these volumes corresponds to that contained in the President's Budget. Procurement data is shown where applicable for items in engineering or operational development. Military construction data is shown where applicable.

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DEFENSEWIDE MISSION SUPPORT (Continued)

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.01.A
DoD Mission Area: #443 - Tactical Communications

Title: Communications Engineering Development
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3318	4135	5267	8213	Continuing	Not Applicable
	QUANTITIES						*
D487	Tactical Multichannel Communications	2018	2240	3300	6080	Continuing	Not Applicable
D488	Tactical Net Radio Communications	1300	1895	1967	2133	Continuing	Not Applicable

* Quantities of Diverse Items

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides engineering development for Army Tactical Communications equipment except those developed under Satellite Communications Ground Environment (PE 3.31.42.A), Joint Tactical Communications Program (TRI-TAC, PE 2.80.10.A), and Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V, PE 6.37.46.A). These types of items include cable/wire systems, telephone/data/record traffic systems, distribution equipments systems, shelters, antenna configuration, multichannel radio/multplier/technical control assemblages, antenna masts, radio couplers, and ancillary equipments that increases the reliability, extendsthe useful life, and/or promotes interoperability in the current inventory. This program also provides the technical support for the development of National and International Military Communications System Technical Standards. The equipments developed under this program are needed to provide tactical commanders with reliable, secure, efficient communications equipment, and ancillary items to insure command and control of tactical forces on a highly mobile, rapidly changing modern battlefield. Goals are to achieve greater reliability, increased mobility, and reduced life cycle costs thru employing state-of-the-art technology, reduced weight, and power consumption, simplified installation and displacement, and reduced operator and maintenance personnel requirements.

C. BASIS FOR FY 1980 RDTE REQUEST: Complete the engineering development actions and initial production support for the remaining upgrading components to extend the useful life cycle, provide digital interface with and facilitate the smooth transition of inventory multichannel assemblage to the future systems developed under the TRI-TAC program. Continue fabrication of the prototype models of the Teletypewriter Multiplexer Facility (AN/TSC-97). Award engineering development contracts for a Long Haul Fiber Optic Cable System to replace the expensive, bulky, heavy metallic twin coaxial cables currently in use, and for a Log

Periodic Antenna to enhance resistance to electronic countermeasures. Continue to provide engineering development efforts for the various elements of the Tactical Net Radio Communications program such as the Special Forces Burst Communications System (SFBCS), Army Marinecraft, and Steerable Null Antenna Processor (SNAP). Continue to provide engineering development support for ancillary equipment related to the Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V). Continue to support National and International Technical Standards development efforts.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE, A (as shown in FY 1979 submission for projects D487 and D488 only)	5331	4665	4292	Continuing	Not Applicable

The primary change from the FY 1979 submission is the restructuring of this program element to transfer Project D149 (Army Support of Defense Communication System) to Program Element 3.31.26.A (Long Haul Communications (DCS)) and Project D481 (Strategic Communications Development) to Program Element 3.31.11.A (Strategic Army Communications (STARCOM)). This restructuring took place to realign these two strategic communications projects to Program Elements in Budget Activity 5 to correct a minor inconsistency in Budget Activities and DoD Mission Areas. The funding profile shown above reflects a comparision of the same projects as in paragraph A. The FY 1978 actual program reduction from the FY 1979 submission estimate is due primarily to reduced RDTE support for Special Forces communications thru increased acquisition of commercially available equipment; elimination of record traffic developments that were duplicative of the TRI-TAC Modular Record Traffic Terminal initiated in FY 1978; and delays in the development of prototypes of the Time Division Digital Multiplexer Assemblage, AN/TSC-97. There is no actual decrease in FY 1979 funding from the FY 1979 submission. Funding in project D488 in the amount of $530 thousand has been inadvertently shown for comparability purposes against the restructuring to Program Element 3.31.11.A ($500 thousand) and 3.31.26.A ($30 thousand). For program execution in FY 1979, the approved program funding level ($2425 thousand) will be applied to project D488. The increase for FY 1980 is primarily due to an acceleration in the transition of the Long Distance Fiber Optic Cable from Advanced Development to Engineering Development.

Program Element: #6.47.01.A
DoD Mission Area: #443 - Tactical Communications

Title: Communications Engineering Development
Budget Activity: #4 - Tactical Programs

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army:						
Funds (current requirements)	69200	133800	93900	*	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	62600	133800	*	-	Continuing	Not Applicable
Quantities (current requirements)	**	**	**	*	**	**
Quantities (as shown in FY 1979 submission)	**	**	**	-	**	**

* OPA is a nonauthorization appropriation therefore funding is not shown for the year following budget year.
** Varying quantities of many different items (i.e., FY 79-20 items; FY 80-14 items).

The primary difference in FY 1978 is for four components of the Secial Forces Burst Communications S
The primary difference in FY 1978 is for four components of the Special Forces Burst Communications System ($4.2M) to satisfy urgent requirements to upgrade Special Forces Communications (SFBCS) to satisfy both normal and expanded missions. FY 1979 reflects no overall change with only minor internal adjustments for the SFBCS. FY 1980 completes the SFBCS and Radio Set AN/PRC-70; continues procurements for the Radio Terminal Set AN/TRC-151; Radio Repeater Set AN/TRC-152; Teletypewriter Set AN/UGC-74; Telephone Set TA-838; and other components/assemblages of the Army Tactical Multichannel Communications System; and initiates procurement of the Transceiver Multicoupler. Procurement funding for this program in the FY 1979 submission was shown in the Procurement Annex (Other Procurement, Army Appropriation and identified as Combat Support Communications) but was inadvertently omitted from the RDTE, Army Congressional Descriptive Summary.

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop tactical communications equipments and systems that will be employed by the Army from the forward edge of the battle area back thru the division and corps areas. Many of these items are also employed in the Theater Army area. This program does not include nor duplicate, those systems/equipment developed under the Joint Tactical Communications (TRI-TAC) Program, the Tactical Satellite Communications Ground Environment (TACSATCOM), and the Single Cannel Ground and Airborne Radio Subsystem (SINCGARS-V). The projects under this program completed the development actions leading to the fielding of the current family of tactical net radios and ancillary items, and to the tactical multichannel/switching systems and equipment currently fielded and in production. This program now is primarily involved in the product improvement and enhancement of the current families of tactical net radios and associated ancillary items plus the tactical multichannel switched system assemblages and equipments. These improvements provide for increased capability, improved operational mobility, increased reliability, extended life cycle, reduced maintenance requirements, improved interface/interoperability with other systems, and facilitates the smooth transition to the future TRI-TAC, TACSATCOM, and SINCGARS systems. This program also develops those tactical communications equipment and ancillary items for unique Army purposes (i.e., Special Forces and Marinecraft), or that are not part of one of the three major systems indicated above but will be used in conjunction with these developments (i.e., Fiber Optic Cable Systems). This program also provides support for the Communications System Design Facility used to design, test, and evaluate technical equipment design modifications, solve interface problems by establishing a particular configuration in a laboratory environment and providing software technical support for fielded tactical automatic circuit and message switching systems. Support is also provided for the development of National (MIL STD 188 Series) and International (NATO and Quadripartite) Communications Systems Technical Standards.

G. RELATED ACTIVITIES: Program Element 6.27.01.A, Communications-Electronics, and Program Element 6.37.07.A, Communications Development, provide the Exploratory and Advanced Developments that are continued into Engineering Development by this effort. This program also provides support to Program Element 6.37.46.A, Single Channel Ground and Airborne Radio Subsystems (SINCGARS-V) for ancillary equipments/components such as antennae, amplifiers, etc.

H. WORK PERFORMED BY: The in-house Army developing organizations are the US Army Communications Research and Development Command (CORADCOM); Project Manager, Army Tactical Communications System (ATACS); and Project Manager, Single Channel Ground and Airborne Radio Subsystem (SINCGARS), all located at Fort Monmouth, NJ. Contractual effort in FY 80 will be performed by Tobyhana Army Depot, PA; Hazeltine Corp, Greenlawn, NY; and Collins Radio, Cedar Rapids, IA. In addition, contract awards are planned for Fiber Optic Cables and Log Periodic Antenna developments.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Prior accomplishments include the completed development actions leading to the fielding of the current family of single channel tactical net radios and associated ancillary items (i.e., Radio Sets AN/VRC-12, AN/PRC-25, and AN/PRC-77); and the current inventory or in production items of tactical multichannel multiplexers/combiners/radios plus associated assemblages, tactical automatic and semiautomatic switching systems (AN/TTC-25, AN/TTC-38, SB-3082, and SB-3614),

Link Encryption Device (Key Generator TSEC/KG-27), Technical Control Facilities (AN/TSQ-84 and AN/TSQ-85), Telephone Sets (TA-838 and 938) and Communications Terminal AN/UGC-74 (Intelligent Teletypewriter). Developments were completed and production initiated for the Small Unit Transceiver (AN/PRC-68), Combination Radio Set (AN/PRC-70) for Special Forces/Ranger Units, and improved antennae for manpack and vehicular versions of the current net radio family. Developments were completed that provided for the upgrading of the Corps/Theater Area Multichannel Network to a 48/96 channel backbone system. Product improvements to multichannel assemblages plus new components were developed to extend the useful life cycle, provide digital access and facilitate a smooth transition to future TRI-TAC developed digital switching systems. In FY 1978 engineering support was provided for initial procurements of the Band IV Tuning Head for AN/GRC-103 Radio Set, High Speed Serial Data Buffer (TD-1065), Radio Terminal Set (AN/TRC-151), Radio Repeater Set (AN/TRC-152), Video Technical Control Facility (AN/TSQ-85) and continued engineering development efforts on the Communications Technical Control Facility (AN/TSQ-84A) upgrade, Time Division Digital Multiplexer (TD-1069), Very High Frequency Transceiver Multicoupler, Radio Set AN/PRC-70, and the Army Marinecraft Radio program (Radio Set AN/URC-92). Continued support for the Communications Systems Design Facility and for development of National and International Communications System Technical Standards.

2. FY 1979 Program: Complete engineering development efforts and provide initial production support on the Time Division Digital Multiplexer (TD-1069) and Communications Technical Control Facility (AN/TSQ-84A) upgrade. Support testing and evaluation on the Steerable Null Antenna Processor (SNAP), 100 foot quick erect antenna mast for AN/GRC-144 Radio Set (field test in Europe), and the 24 Channel Combiner (TD-1250). Type classify the Very High Frequency (VHF) Transceiver Multicoupler for net radios, the Random Signal Generator (SG-1139) and the TD-1250. Participate in the Follow-on Evaluation (FOE) on the Radio Set AN/PRC-70 used by Special Forces and Ranger units. Continue engineering support for the Special Forces Burst Communications System (SFBCS), the Army Marinecraft Program, the Communications System Design Facility, and the development of National and International Communications System Technical Standards. Finalize the procurement data package for FY 1980 engineering development contract award on the Log Periodic Antenna. Prepare for the transition from advanced development and a FY 1980 engineering development contract award for the Long Haul Fiber Optic Cable System. Initiate depot fabrication of prototype models of the Teletypewriter Multiplexer Facility (AN/TSC-97) used to house the TD-1069 at major communications nodal points in the Corps Area.

3. FY 1980 Planned Program: Provide initial production support for the Time Division Digital Multiplexer (TD-1069), Random Signal Generator (SG-1139), 24 Channel Combiner (TD-1250), Communications Technical Control Facility (AN/TSQ-84A) upgrade, and the Transceiver Multicoupler. Type classify the Steerable Null Antenna Processor (SNAP). Continue fabrication of the prototype models of the Teletypewriter Multiplexer Facility (AN/TSC-97) and prepare for the FY 1981 Development and Operational Test (DT/OT-II). Prepare for FY 1981 transition from advanced development and engineering development contract award for the Area Distribution Fiber Optic Cable System and the Millimeter Wave Command Post Radio to replace the heavy, bulky, slow to install multipair metallic distribution cables used in and around command posts from Brigade thru Corps level. Prepare to award FY 1981 engineering development contract for a Low Profile Vehicular Antenna for net radios. Continue engineering development efforts and support on the Special Forces Burst Communications System (SFBCS) components, Steerable Null Antenna Processor, Army Marinecraft Program, the Communications Systems Design Facility, and for National and International Communications Systems Technical

Standards development. Award engineering development contracts for a Long Haul Fiber Optic Cable System to replace the heavy, bulky, slow to install metallic twin coaxial cables currently in use and for a Log Periodic Antenna for net radios. All necessary experimental work will be performed and the proposed systems will be ready for full scale development.

4. FY 1981 Planned Program: Complete fabrication and testing, type classify, award production contract, and provide initial production support for the Teletype Multiplexer Facility (AN/TSC-97). Continue engineering development efforts for Long Haul Fiber Cable System. Award engineering development contracts for Area Distribution Fiber Optic Cable System, Millimeter Wave Command Post Radio, and Low Profile Vehicular Antenna for net radios. All necessary experimental work will be performed and the proposed systems will be ready for full scale development. Continue engineering development and initial production support for the Burst Communications System components, Army Marinecraft radio installations, and Steerable Null Antenna Processor (SNAP). Continue support for the Communications System Design Facility and for National and International Technical Standards development. Prepare for FY 1982 engineering development contract awards for a net radio High Power Amplifier and a Quick Erection Antenna Mast.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	7000	4000	2000	3500	15100	44349
	QUANTITIES (Not Feasible to List)						
DL73	Remotely Monitored Battlefield Sensor System (REMBASS)	7000	4000	2000	3500	15100	44349

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army faces highly mobile and heavily mechanized forces who will make maximum use of terrain masking, bad weather, line-of-site restrictions and electronic countermeasures. The REMBASS program is expected to meet this challenge by the development of a passive all-weather Unattended Ground Sensor (UGS) system to complement the active sensor systems. The specific objective of this program is to conduct Engineering Development (ED) of unattended ground sensor equipment capable of operation anywhere in the world. This equipment will improve the Army's capability for early warning alert, ground surveillance, and target development during all conditions of weather and visibility. This program element consists of one active ED project - REMBASS. REMBASS consists of unattended ground sensors, including seismic, seismic acoustic classifier, magnetic, strain cable, infrared, relay devices, read-out devices, and power sources which will provide the field commander with a passive unattended ground sensor system in 1985.

C. BASIS FOR FY 1980 RDTE REQUEST: Completion of REMBASS ED hardware fabrication contract awarded in FY 1977 for configuration end items.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	7094	8690	11080	13321	51000

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

Changes in FY 1980 and beyond result from discontinuing the 6.3 effort and the follow-on 6.4 activity in this program. The FY 1979 difference of 4.7 million was as a result of congressional reduction. The Army supplemental request was deleted by OSD in favor of higher priority programs. The FY 1979 program changes result in a revised RDTE profile for REMBASS.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement Army						
PEWS: Funds	6200	0	0	0	0	12200
Quanity	2449	0	0	0	0	4000
REMBASS Funds				0	194,000	194,500
Quanities						(Not to Feasible to List)

Platoon Early Warning System (PEWS) procurement dollars reflect actual costs. REMBASS procurement changes are a result of planning for 24 Division Force, to include logistic backup. Initial effort is to outfit European Divisions.

Program Element: #6.47.04.A Title: Unattended Ground Sensors (UGS)
DoD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop the techniques of target detection location, identification, and classification using passive remote sensors and produce Engineering Development (ED) system models suitable for extensive user tests. The element consists of one active project, REMBASS. Feasibility of the remote sensor concept was proven in Vietnam between 1968 and 1973. Selected Advanced Development (AD) models were tested and transitioned into ED as REMBASS. These items will meet the basic requirements of the user with an expected Initial Operational Capability (IOC) off FY 1983. It employs a variety of sensor types including magnetic, seismic, seismic acoustic classifier, strain cable and infrared.

G. RELATED ACTIVITIES: Coordination between the services has been formalized with a Joint Service Memorandum of Agreement for Tactical Remote and Physical Security Sensor Systems Research, Development, Test, and Evaluation. This joint agreement establishes a Joint Service Coordination Committee (JSCC) that reviews all planned and ongoing Research, Development, Test, and Evaluation (RDTE) in the Tactical Remote and Physical Security Sensor area to insure appropriate interoperability between service systems and cooperative and coordinated RDTE efforts. There is extensive international interest in the REMBASS program. Inquiries have been received from Australia, Canada, Egypt, France, Germany, Israel, Korea, Norway, Saudi Arabia, Sweden, and the United Kingdom. Information has been provided to NATO panels and other international forums. Commander, European Command, initiated a combined (United Kingdom, Germany, United States) study program, AVID GUARDIAN, which proved conclusively that unattended ground sensors perform reliably and effectively under European conditions of heavy military traffic, high speeds and severe weather. Probable domestic users include the State Department (Sinai Field Mission), Immigration and Nuturalization Service, Drug Enforcement Agency, US Army and US Marine Corps. Domestic inquiries have been received concerning REMBASS-type hardware for protection of PERSHING missile battalions, MX missile, ground-launch CRUISE missile, and tactical aircraft (i.e., B-52). This program element is the ED effort corresponding to work previously reported under 6.37.19.A, Surveillance, Target Acquisition and Night Observation (STANO) Systems, and program element 6.47.23.A, STANO Systems through FY 1975. The Advanced Development (AD) work reported under program element 6.37.04.A has been discontinued.

H. WORK PERFORMED BY: Responsibility for management of the REMBASS project is assigned to Project Manager (PM), REMBASS, US Army Electronics Research and Development Command (ERADCOM), Fort Monmouth, NJ. In-house work is performed by the US Army Electronics Research and Development Command (ERADCOM), Fort Monmouth, NJ and Adelphi, MD; US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA; Human Engineering Laboratory (HEL), Aberdeen Proving Ground, MD; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors include: Chamberlain Manufacturing Corporation, Waterloo, IA; Mitre Corporation, McLean, VA; RCA Corporation, Camden, NJ, Analytics Incorporated, Philadelphia, PA.

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Rembass: Validation In-Process Review (IPR) for basic components of the REMBASS to enter ED was approved by Department of the Army on 17 May 1976. Three design plan contracts were awarded: GTE Sylvania, RCA Corporation, and American Electronics Laboratory. A Special IPR was conducted on 10 May 1977 to finalize the coordinated developer/user configuration for basic REMBASS. Based on evaluation of the resulting design plans, an engineering development contract was awarded in June 1977 to RCA Corp. PEWS: Fabrication of ED hardware for the Platoon Early Warning System (PEWS) AN/TRS-2 was completed. PEWS will fulfill the small unit package requirement of the REMBASS. Development test II (DT II) and Operational Test II (OT II) were completed. A successful In-Process Review (IPR) was conducted on 1 June 1977 and PEWS has entered the production phase of development with contract award 31 July 1978 to International Signal and Control Corp., Lancaster, PA.

2. FY 1979 Program: Continue Engineering Development contract for REMBASS hardware. A final design review will be held and approval given for fabrication of configuration end items. Funding decrease is a result of congressional action.

3. FY 1980 Planned Program: Complete fabrication of configuration end items less artillery items; start Development Test II.

4. FY 1981 Planned Program: Complete REMBASS Development Test II, start Operational Test II for REMBASS hardware less artillery delivery items. Start work on artillery delivery capability.

5. Program to Completion: This is a continuing program. Award production contract for REMBASS in FY 1984.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element #6.47.06.A
DoD Mission Area: #449 - CB Defense/Chemical Warfare

Title: Radiological Defense Equipment
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	665	1055	948	1178	Continuing	Not Applicable
	QUANTITIES						
D517	Radiological Defense Equipment	665	1055	948	1178	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Radiological measurement detection and alarm equipment is required on the tactical battlefield to: enable efficient use of radiological monitoring and survey assets; provide commanders with real time knowledge of radiation patterns on the ground; and provide commanders and medical personnel with the radiation history of individuals and units. This program provides for engineering development of a family of radiological detecting and measuring equipment and systems to enable troops and equipment to function effectively and safely on a nuclear battlefield. Equipment under development provides substantial improvement in a radiation measurement, detection and recording over those systems currently fielded. New equipment will measure prompt as well as delayed radiation; neutron as well as gamma-ray levels; and will have a substantially improved dynamic measurement range. Equipment to be replaced typically has 1950 or early-1960 technology. All these new and improved capabilities are required to insure an operational capability in the tactical nuclear environments of a conventional-nuclear battlefield. Principal items of equipment under development include a vehicular radiac system, an aerial radiac system, tactical and individual dosimeters, and a fixed installation fallout monitor and alarm system.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds requested will be used to continue the engineering development of the x-ray probe for the Alpha survey meter. The low rate initial production of the vehicular, tactical and aerial radiacs will continue. The procurement data package for the individual dosimeter will be prepared in accordance with appropriate US-UK arrangement. The procurement data package for the installation monitor will also be prepared.

Program Element: #6.47.06.A
DoD Mission Area: #449 - CB Defense/Chemical Warfare

Title: Radiological Defense Equipment
Budget Activity: #4 - Tactical Programs

Major Milestones		Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Radiacmeter			
Vehicular	IOC*	FY81	Not Applicable
Aerial	IOC	FY82	
Individual	IOC	FY82	
Tactical	IOC	FY82	
Installation	IOC	FY82	
Monitor	IOC	FY82	
X-Ray Probe	TC**	FY81	

*IOC - Initial Operational Capability
**TC - Type Classification

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimate Costs
RDTE					
Funds (as shown in FY 1979 submission)	773	1055	915	Not Applicable	Not Applicable

The changes occur in FY 1978 and FY 1980. The decrease in FY 1978 funding is due primarily to the delay in type classifying the vehicular and tactical dosimeters in FY 1978. The increase in FY 1980 funding is due to adjustments to allow for inflation.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimate Cost
Other Procurement, Army						
Funds (current requirements)	0	5000	3500	1300	Continuing	Not Applicable
Funds (as shown in FY 1979	320	5829	3909	-	Continuing	Not Applicable
Quantities (current requirement)*						
Quantities (as shown in FY 1979 submission)*						

* Numerous procurements of a variety of instruments.

F. DETAILED BACKGROUND AND DESCRIPTION: Current dose-rate meters are relatively inaccurate, do not cover the dynamic range required, and do not measure prompt radiation. Currently there is no rapid aerial survey capability, nor is there an adequate fallout measurement and alarm system for fixed and semi-fixed installations. The objective of this program is to develop dosimetric devices having performance parameters required by today's nuclear weapons, tactics and doctrine. A family of radiological equipment will be developed to provide aerial, vehicular, dismounted, and fixed installation capabilities to measure both prompt and delayed (fallout or induced) radiation. Individual and tactical dosimeters to measure prompt and delayed neutron and gamma radiation are being developed on a low cost basis for individual issue. These individual and tactical dosimeters will provide commanders with an immediate knowledge of the recent radiation history of their units and will provide a lifetime radiation history for the individual soldier. The vehicular radiac system will mount in armored fighting vehicles and can effectively monitor fallout radiation levels from within the vehicle. It provides an extremely fast on-the-ground radiation survey capability that does not exist today. The vehicular radiac may also be used in a dismounted role. The fixed installation fallout monitor provides a capability to remotely monitor radiation in as many as 10 separate locations at fixed or semi-fixed installations such as a depots or command posts. An x-ray probe for the alpha radiation detection is being developed that will enable standoff detection of plutonium. This capability is useful in the event of an accident involving the scatter of plutonium since it is much faster and safer than current methods. Current procedures require a "hands and knees" survey with the alpha detector within a few centimeters of the ground.

G. RELATED ACTIVITIES: This effort is related to exploratory development conducted in Program Element (PE) 3.27.03.A, Combat Surveillance/Target Acquisition and Identification; and to advanced development conducted in PE 6.36.04.A, Nuclear Munitions and Radiacs. A Navy alpha monitoring and survey meter has been adapted for Army use and the Air Force is participating in the tactical dosimeter program. An installation fallout monitor and alarm system, the AN-GDQ-3 is being developed jointly with the Canadian Department of Defense Production and the DT-236 individual dosimeter is being developed jointly with the United Kingdom Ministry of Defense. The vehicular radiac system was developed to be compatible with all armored fighting vehicles. Liaison with other services is maintained to preclude duplication.

H. WORK PERFORMED BY: US Army Electronics Research and Development Command (ERADACOM), Fort Monmouth, NJ; the top four contractors are Rockwell International Corporation, Los Angeles, CA; Radio Corporation of America, Philadelphia, PA; Nuclear Corporation of America, Denville, NJ; Canadian Admiral Corporation, Toronto, Canada.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: An aerial radiac has been developed and successfully tested for helicopter application that provides a capability for rapid ground radiological survey over large areas by aircraft. The vehicular radiac (AN-VDR-1) successfully completed the second phase of both developmental and operational testing. This instrument provides a new capability to monitor radiation fields from within armored vehicles during closed-hatch operations. Feasibility has been established

to directly measure total cumulative neutron and gamma ray dose for individual dosimeters. The technology involves silver activated photo luminescent glass for gamma radiation and silicon junction diodes for neutron dose, and gives the commander and medical personnel an immediate indication of an individual soldier's total radiation history. Materials have been developed for a small lightweight tactical dosimeter that measures and records extremely small electrical charges that are caused by low doses of either neutron or gamma radiation. First production of the aerial radiac was initiated. Producibility engineering packages for the vehicular radiac was prepared. Engineering development of the individual dosimeter was continued and Developmental/Operational Test II (DT/OT II) was initiated. Engineering development of the fixed installation fallout monitor was completed, and development and operational testing was initiated.

2. FY 1979 Program: Type classify and begin low rate initial production of the vehicular radiac. Begin competitive full scale procurement of the aerial radiac. Type classify the individual dosimeter, assimilate and coordinate United Kingdom procurement data and information. Complete development and testing of the installation fallout alarm and monitor. Type classify and begin low rate initial production for the tactical dosimeter. Begin engineering development and begin testing of an x-ray probe for the alpha particle detection. Transition the cost effective improvements to the family of radiac equipment to the engineering development phase. FY 79 funding is higher than for FY 78 because more individual items of radiac equipment are being pursued. This is a key year for replacing obsolescent equipment.

3. FY 1980 Planned Program: Continue testing of the x-ray probe for the alpha meter. Continue low rate initial production of the vehicular radiac. Complete preproduction activities for the individual dosimeter in accordance with appropriate US-UK arrangement. Continue low rate initial production of the tactical dosimeter. Initial activities will be conducted, in coordination with Canada, for production of the fixed installation fallout monitor.

4. FY 1981 Planned Program: Prepare procurement packages for full scale procurement of the vehicular and aerial radiacs. Initial Operational Capability will be achieved. Complete testing of the x-ray probe and type classify. Continue to investigate new technology such as large scale integration that can substantially reduce production costs.

5. Program to Completion: This is a continuing program. Additional items will be considered for development when new requirements are validated and when new technology offers significant capability or cost advantages.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	1700	2790	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D530	Identification Friend or Foe (IFF) Equipment	0	0	1700	2790	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: In FY 1980 and 1981, effort will be devoted to the evolutionary development of the Army's Air Defense Identification System, Air Traffic Control Radar Beacon System/Identification Friend or Foe (IFF)/MARK XII/Systems Army Integrated Meteorological System (AIMS) to improve its effectiveness. The need for rapid, reliable, and secure Air Defense identification systems has become more important as the ranges at which targets can be effectively engaged extends beyond the ranges at which they can be positively identified. US (United States) military forces and some of our allies, to include some but not all of our North Atlantic Treaty Organization (NATO) allies, have adopted the MARK XII system. The full advantage of this system is not realized unless all friendly forces are equipped. This work is being performed as a coordinated part of a Tri-Service effort which the Air Force leads. The Tri-Service effort is being accomplished in conjunction with cooperative efforts with the United Kingdom. The work will stress the reduction of MARK XII vulnerabilities to exploitation and jamming, and improve the reliability (confidence) of identification.

C. BASIS FOR FY 1980 RDTE REQUEST: This program is a new start for the full scale development of improved Air Defense MARK XII Identification components and new Battlefield IFF systems. The Battlefield systems are now expected to remain in Advanced Development through 1981 to allow time for North Atlantic Treaty Organization (NATO) cooperative development and interoperability studies. The Engineering Development efforts on the MARK XII components follow from FY 1977, 1978, and 1979. Advanced Development efforts in Program Element 6.37.06.A, Identification Friend or Foe (IFF) developments. In FY 1977 and 1978, the vulnerabilities of MARK XII equipment were measured, while in FY 1979 circuitry solutions to these vulnerabilities will be determined in configurations that are form and fit compatible with the existing equipment. This course is expected to extend the useful life of MARK XII systems, in which investments in excess of $1 billion have been made, as well as allow for orderly transition to meet the long-term requirements of the NATO Future Identification SYstem (FIS). The Required Operational Capability document necessary for authorization is essential to satisfy the Army's portion of the US/UK Memorandum of Understanding dealing with the upgrading of the MARK XII system.

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	0	1000	1316	Continuing	Not Applicable

The FY 1979 descriptive summary indicated an FY 1979 start for this Program Element (Engineering Development). It has since been determined that the Advanced Development (AD) work under Program Element 6.37.06.A required to support the start of Engineering Development is more extensive than had been anticipated, requiring AD to continue through FY 1979. A major factor for this additional AD is the development of a new technical mode of operational which can improve operational performance significantly. FY 1980 funding increase will provide for faster start up of work described.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The need for rapid, reliable, and secure Air Defense identification systems has become more important as the ranges at which targets can be effectively engaged extends beyond the ranges at which they can be positively identified. US (United States) military forces and some of our allies, to include some but not all of our North Atlantic Treaty Organization (NATO) allies, have adopted the MARK XII system. The full advantage of this system is not realized unless all friendly forces are equipped. A Memorandum of Understanding is being negotiated with the United Kingdom to cooperatively develop improvements to the MARK XII system. The objective of this effort is to eliminate shortcomings of the MARK XII system so that it, or an improved system compatible with MARK XII, is accepted by all NATO allies. The Tri-Service program supporting this cooperative effort is managed by the Air Force. In support of this effort, the Army is developing test standards, measuring the vulnerabilities of the MARK XII, and developing fixes. This effort will promote NATO interoperability, and extend the useful life of an investment in excess of $1 billion in Army MARK XII equipment. MARK XII equipment is used in numerous Identification Friend or Foe (IFF) equipments, e.g., AN/TPX-46 and AN/APX-50 interrogators used with the Improved HAWK and Hercules missiles, Forward Area Alert Radar (FAAR), and AN/APX-100 airborne transponder.

G. RELATED ACTIVITIES: The Army is working with the Navy and the Air Force to develop improvements to the MARK XII identification system that will enhance the operational capabilities and ensure that the system satisfies the requirements for continued use defined by NATO Panel A/C 302 Sub-Group 6.

H. WORK PERFORMED BY: In-house work is being performed by the US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractors that are expected to actively participate are: Hazeltine Corporation, Greenlawn, NY; Teledyne Electronics, San Diego, CA; Texas Instruments, Dallas, TX; and RCA Corporation, Camden, NJ.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Not Applicable.

2. FY 1979 Program: Not Applicable.

3. FY 1980 Planned Program: Formulate procurement data for external contract for Evolutionary Improvement to MARK XII interrogators and transponders. This effort will be in conjunction with other Services in support of a joint developmental plan with the United Kingdom. FY 1980 efforts will involve design of Product Improvement Kits for MARK XII interrogators to improve operational performance significantly via a new technical mode of operation.

4. FY 1981 Planned Program: Begin procurement of engineering modules which can be integrated with Army interrogators AN/TPX-46 and AN/TPX-50, and transponders AN/APX-72 and AN/APX-100. Modules will enable operation to meet NATO long-term requirements, extend utility of large investment in MARK XII for HAWK, Hercules, and Surface-to-Air Millile-Development (PATRIOT), Forward Area Alert Radar (FAAR).

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

5. Program to Completion: This is a continuing program. Complete development and testing of modules to improve performance of the MARK XII modules. In FY 1982 and 1983 time frame, begin Engineering Development of an identification system for the Forward Battle Zone. This system is expected to be the result of cooperative efforts with North Atlantic Treaty Organization (NATO) allies.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2156	3812	3000	5463	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL70	Night Vision Devices	2156	3812	3000	5463	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to perform Engineering Development and obtain Type Classification of Night Vision Devices which, while not specifically dedicated as parts of a major weapon system, are needed by many elements of the field Army to perform military functions at night and during periods of limited visibility with an efficiency approaching that of daylight. These devices are needed in order to provide for target acquisition and task accomplishment on the obscured, 24-hour-a-day, battlefield. Due to the relatively high cost of night vision devices, the number of systems that can be planned to be procured has been constrained to a number much less than that which is required. The program is directed so that life cycle costs are minimized by making maximum use of common modules in the night sights of as many weapon systems as possible, and by making technology changes compatible with existing sights. Advances realized in Program Element, 6.37.10.A, Night Vision Advanced Development are utilized.

C. BASIS FOR FY 1980 RDTE REQUEST: Development will continue on high performance lightweight Aviation Night Vision Goggles that will enable nap-of-the-earth flight operations under starlight and overcast starlight. Present Goggles are only capable of nap-of-the-earth flight at quarter moonlight or better. The dramatic increase in capability has been made possible by the exploitation of recent advancements in 3rd generation image intensification technology. The Goggles will be used on all helicopters not equipped with the Pilot's Night Vision System (PNVS). The engineering development of the low cost night vision aid will be started. These devices will make possible the fielding of night vision aids for the individual soldier in the numbers required at a cost which can be afforded by the Army.

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	2638	3812	5433	Continuing	Not Applicable

Reduction in FY 1978 ($482) was due to internal Army reprograming for higher priority programs. Decrease in FY 1980 ($2433) was due to reevaluation and restructure of tasks.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: With the current second generation Night Vision Goggles pilots cannot fly nap-of-the-earth at less than 1/4 moonlight illumination. Development of a high performance Aviation Night Vision Goggle will provide a capability to fly nap-of-the-earth with less than starlight illumination. Using the same 3d generation image intensification technology in a low cost night vision aid will reduce the production cost of driver's goggles from $6500 to $2000 each. Increases in reliability of these tubes will further reduce life cycle costs.

G. RELATED ACTIVITIES: The US Navy and Air Force utilize the same Thermal Imaging Common Modules as the Army. The Army has configuration management responsibility for these Thermal Imaging Systems, which are being utilized by the Federal Republic of Germany in their LEOPARD, MARDER, and LUCHS combat vehicle systems. The efforts of the Services are closely coordinated and duplication avoided through Tri-Service agreements. Negotiations are in progress to include other NATO allies, specifically Italy, Netherlands, and the United Kingdom, as common module users.

H. WORK PERFORMED BY: In-house work is performed by the US Army Night Vision Laboratory, Fort Belvoir, VA; and the US Army Missile Research and Development Command, Redstone Arsenal, AL. Major contractors are Varo Inc., Garland, TX; Martin-Marietta Corporation, Orlando, FL; and Varian Corporation, Palo Alto, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: This program has produced a variety of night vision equipment, both manportable items used by the individual soldier, and combat vehicle mounted devices. Recent accomplishments include type classification of the Individual Weapon Sight (AN/PVS-4), Crew Served Weapon Sight (AN/TVS-5), Driver's Viewer (AN/VVS-2), Handheld Thermal Viewer (AN/PAS-7), Night Observation Device Long Range (NODLR) (AN/TAS-6) and Infrared (IR) Aiming Light AN/PAQ-4. Development of the integrated NODLR closed cycle cooler, which will eliminate reliance on bottles of compressed gas, was completed. Development Test II and Operational Test II was completed in the Infrared Aiming Light.

2. FY 1979 Program: Evaluation of the integrated NODLR closed cycle cooler will be completed and initial production supported. Engineering Development of the Infrared Aiming Light will be completed. Engineering Development of high performance pilot night vision goggles and support for providing the Advanced Attack Helicopter (AAH) and Cobra TOW helicopter with a thermal imaging capability will continue.

3. FY 1980 Planned Program: Continue Engineering Development of high performance pilot's night vision goggles and conduct Development Test II and Operational Test II. Continue support of AAH and Cobra TOW helicopter systems. Start Engineering Development of low cost night vision aids. All necessary experimental work will be performed and the proposed system will be ready for full-scale development.

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

4. FY 1981 Planned Program: Continue Engineering Development of pilots goggles. Continue Engineering Development of low cost night vision aids and helicopters infrared programs. Start Engineering Development of 2d generation infrared systems. All necessary experimental work will be performed and the proposed system will be ready for full scale development.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.11.A
DoD Mission Area: #445 - Electronic Warfare/Counter C^3

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	9479	9082	9928	11995	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DC52	Scout/Attack Helicopter Survivability Systems	3754	2480	3150	5825	Continuing	Not Applicable
D665	Special Electronic Mission Aircraft Survivability Systems	5725	6602	6778	6170	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element (PE) provides for the development, test, and type classification for production and fielding of required Aircraft Survivability Equipment (ASE) systems. The program combines the passive signature reduction infrared (IR) suppressors and aircraft integration project, DC52 (formerly 6.42.09.A/DC52), with the complementary warning and active electronic self-protection countermeasures project D665. Together, they address threat systems encompassing the IR, optical/laser and radar-directed air defense weapons. The program is time phased to be a logical follow-on to advanced developments from PE 6.37.11.A, Aircraft Electronic Warfare Self-Protection (AEWSP) Equipment. Resultant production plans achieve the survivability needed to meet the attack, assault, and special electronic mission aircraft (SEMA) requirements. The program is adjusted continually to meet the changing nature of the threat and technology. This program responds to stated requirements of the Required Operational Capability (ROC) for Aircraft Survivability Equipment (ASE). ASE is needed for both current and developmental Army aircraft to accomplish their combat missions. ASE increases combat effectiveness by reducing or eliminating the ability of threat air defense systems to detect, hit, damage, or destroy Army aircraft.

C. BASIS FOR FY 1980 RDTE REQUEST: This program will complete/continue the ongoing contractual development, integration, and testing for the AN/ALQ-156 missile detector system, the AN/ALQ-162 continuous wave (CW) jammer, the AN/AVR-2 laser warning system, and the AN/ALQ-136(V)2 advanced radar jammer, (which is being developed to meet SEE SAFE requirements for Special Electronic Mission Aircraft (SEMA) to counter threat airborne intercepters).

Program Element: #6.47.11.A
DoD Mission Area: #445 - Electronic Warfare/Counter C^3

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	10274	9082	11916	Continuing	Not Applicable

The major difference in RDTE funding in FY 1980 resulted from delay of initiation of Engineering Development of Advanced Surface-to-Air Missile (SAM) Jammer in order to capitalize on ongoing tri-Service advanced development work in this critical area. The FY 1978 actual decrease ($795K) is a result of Service reprogramming to meet higher priority projects within the materiel developing command.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Army:						
Funds (current requirements)	13357	28009	46627	39416	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	15929	26574	48066	-	Continuing	Not Applicable
Quantities (current requirements)	1028	1126	1718	1331	Continuing	Not Applicable
Quantities (as shown in FY 1979 submission)	873	875	2004	-	Continuing	Not Applicable

Procurement quantities include up to 14 different types of aircraft survivability equipment which support 11 separate aircraft modification lines. Funding and quantity variations reflect changes in Aircraft Survivability Equipment (ASE) applications to varying requirements in aircraft production/modification schedules.

Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DoD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: This program element (PE), like the advanced development PE, Aircraft Electronic Warfare Self-Protection Systems (AEWSP) Equipment, combines two engineering development (ED) projects managed by the Army Project Manager for Aircraft Survivability Equipment (PM-ASE): DC52 (formerly 6.42.09/DC52) Scout/Attack Helicopter Survivability Systems, and D665, Special Electronic Mission Aircraft Survivability Systems. Both projects were initiated in 1971 after the Soviets introduced the SA-7 shoulder fired surface-to-air missile (SAM) in the Mideast. Project DC52 concentrates on passive signature reduction, infrared (IR) suppression, vulnerability reduction, ballistic hardening, and aircraft integration. Project D665 develops the complementary warning and active jamming systems. In 1972, the SA-7 was used against Army helicopters in Vietnam. The aircraft were quickly equipped with the IR suppressors and low reflectance paint developed under this program and the advanced development program, PE 6.37.11.A, AEWSP Equipment. Flare dispensers were also adapted and successfully employed for larger helicopters. An IR jammer for use on fixed-wing aircraft demonstrated the required capabilities to defeat the SA-7 missile. Radar warning receivers (AN/APR-25/26) were used to detect enemy radar-directed weapons. Together, these efforts demonstrated the need for and the credibility of aircraft survivability equipment (ASE) and the countermeasures across the electromagnetic spectrum. Accordingly, requirements were established for present fleet and developmental aircraft to enable them to complete critical combat missions. Programs were established and funding identified for growth threats. The objectives of the individual DC52 and D665 projects are maintained in the combined program.

G. RELATED ACTIVITIES: This program is conducted in conjuntion with PE 6.37.11.A, Aircraft Electronic Warfare Self-Protection (AEWSP) Equipment, also managed by the Army Project Manager (PM) for ASE and PE 6.32.15.A, Joint Survivability Investigations, of which the PM-ASE is the Senior Army Representative. In 1977, the Joint Logistics Commanders signed a Memorandum of Agreement outlining responsibilities for tri-Service development and production of the following items of equipment for helicopters and selected fixed-wing aircraft: (1) Army: Radar warning receivers, radar jammers, infrared (IR) jammers for small helicopters, pulse doppler missile warning detectors and laser warning receivers; (2) Navy: IR jammers for large helicopters, continuous wave (CW) radar jammers and ultraviolet missile warning detectors; and (3) Air Force: IR missile warning detectors for fixed-wing and selected large helicopters. International coordination is achieved through North Atlantic Treaty Organization (NATO) Army Armaments Group (NAAG) and Quadripartite Working Groups. At the request of the Germans and United Kingdom representation discussions on the joint use of US Army ASE were conducted in 1978.

H. WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, MO; US Army Electronics Research and Development Command (ERADCOM), Ft Monmouth, NJ; Electronic Warfare Laboratory, Ft Monmouth, NJ: US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NH; ITT Corporation, Nutley, NJ; TRACOR, Inc., Austin, TX; Calspan Corporation, Buffalo, NY; Emerson Electronic, St. Louis, MO; Grumman Aircraft Company, Bethpage, NY; Loral, Inc., Yonkers, NY; Garrett AiResearch, Torrance, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: In response to the SA-7 missile, introduced into Vietnam in 1972, infrared (IR) suppressors and low reflectance IR paint were produced from advanced development models and applied to attack, observation and utility helicopters. These IR signature reduction equipments were successful in reducing the effectiveness of the SA-7 virtually

to zero and convincingly proved that Army aircraft could survive against sophisticated infrared (IR) missiles. In 1976, improved IR suppressors were fielded to front line US tactical aircraft in Germany, Korea, and the United States. Advanced development was completed and engineering development was initiated for IR suppressors for growth threats for the following aircraft: OH-58 (FY 1975), OV-1 MOHAWK (FY 1975), AH-1 COBRA (FY 1977), and RU-21 GUARDRAIL (FY 1977). The AN/ALQ-144 IR jammer, applicable to current attack, utility, and scout helicopters as well as the AH-64, and UH-60 BLACK HAWK, completed Development Test (DT)/Operational Test (OT) II in 1977, confirming requirements and effectiveness. The dual purpose M-130 chaff/flare dispenser successfully completed engineering development and demonstrated successful countermeasures capability against the prime ground based air defense threats as well as against airborne interceptors. The M-130 entered production in 1977. The AN/ALQ-156 missile detector system entered engineering development (ED) in 1976 and continued ED through FY 1978. The AN/APR-39(V)2 advanced radar warning receiver and ALQ-136(V)1 entered engineering development in 1977. Vulnerability reduction efforts to harden the tailboom of the AH-1S COBRA helicopter were completed. The OH-58 vulnerability reduction (VR) programs for flight controls and transmission, initiated in FY 1976, were completed and entered production. The flat plate canopies to reduce glare for the OH-58 and AH-1 helicopters satisfactorily completed engineering development and were approved for production. The overall aircraft survivability equipment (ASE) program in each of the technological areas accomplished planned work and is within the schedule and cost goals. Most of the above equipments are being adapted as appropriate by other Services in accordance with the Tri-Service Memorandum of Agreement. Production programs are being planned and programed by the Navy for Marine use of the AN/APR-39(V)1 and (V)2 radar warning receivers, the AN/ALQ-144 IR jammer, the AN/ALQ-156 missile warning detector, the AN/ALQ-136 radar jammer, the optical warning location detection system, and the laser warning receiver.

2. FY 1979 Program: This program continues the required developments for the incremental funding of ongoing ED Programs; The AN/APR-39(V)2 radar warning receiver for the Special Mission Aircraft (SEMA), AH-64 and UH-60, and US Navy; the AN/ALQ-156 missile detector system (used with M130 flare dispenser) for SEMA aircraft and the CH-47; the AN/ALQ-136(V)1 radar jammer for attack helicopters; and the AH-1 hot metal plus plume (HM+P) suppressor. ED is starting for the AN/ALQ-162, the ARMY/NAVY continous wave (CW) jammer, and the AN/ALQ-136(V)2 airborne interceptor radar jammer and the AN/AVR-2 laser warning receiver (which couples with the AN/APR-39 radar warning receiver). Also, the successful AH-1 Hot Metal Plus Plume (HM+P) suppressor is being adapted for the EH-1 SEMA and UH-1V (MEDIVAC) aircraft for ED and testing.

3. FY 1980 Planned Program: The FY 1980 program continues the ED of the AN/AVR-2 laser warning system for tactical, attack aircraft, the AN/ALQ-136(V)2 airborne interceptor radar jammer and the AN/ALQ-156 missile detector system for SEMA, and the AN/ALQ-162 continous wave (CW) radar jammer with the Navy for special electronic mission aircraft. Production validation testing is planned for the OV/RV suppressor.

4. FY 1981 Planned Program: ED efforts will be substantially completed for the AN/ALQ-136(V)2 airborne interceptor radar jammer, AN/ALQ-156 missile detector system, and the AN/ALQ-162 continuous wave (CW) radar jammer for the SEMA aircraft and the US Navy. ED is also planned to be completed for the AN/AVR-2 laser warning receiver. Production validation testing is planned for the AN/APR-39(V)2 radar warning receiver, the AN/ALQ-156 missile detector system and the AN/ALQ-136(V)1 radar jammer. ED also starts for the advanced SAM jammer.

Program Element: #6.47.11.A
DoD Mission Area: #445 - Electronic Warfare Counter C^3

Title: Aircraft Electronic Warfare (EW) Self-Protection System
Budget Activity: #4 - Tactical Programs

5. Program to Completion: The major efforts will continue the advanced SAM jammer, and begin the optical countermeasures system engineering development. This is a continuing program and developments will be transferred from advanced development program element 6.37.11.A, Aircraft EW Self-Protection Equipment. Countermeasures against threat weapons requires constant review and updating. All aircraft survivability programs, advance development and engineering development, respond to stated user requirements and threat documentation. The requirements and threats are reviewed on a continuing basis by the Aircraft Survivability Equipment (ASE) Permanent Steering Group (PSG). The ASE PSG provides a forum for joint user and developer review of all aspects of aircraft survivability with broad representation from the US Army Training and Doctrine Command (TRADOC) and US Army Materiel Development and Readiness Command (DARCOM).

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is the engineering development (ED) of airborne Aircraft Electronic Warfare Self-Protection (AEWSP) Systems to negate or degrade the use of threat anti-aircraft weapons using infrared, radar, or optical guidance. AEWSP systems are developed after feasibility has been demonstrated under Project #D653 Special Electronic Mission Aircraft Survivability Equipment. This project interfaces with Project #DC52 Scout/Attack Helicopter Survivability Systems which is in this Program Element, 6.47.11.A. The approach in this project is to continue the development of selected electronic active response, threat detection, and complementing ground support equipments. Emphasis is placed on equipment integration for a particular aircraft as part of its survivability suit and associated system reliability, availability, maintainability, configuration, and automated data management, personnel development, logistic support, and facilities requirements.

B. RELATED ACTIVITIES: Related AEWSP developments are conducted by Air Force and Navy. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering (USDRE), subgroups and working panels of the Technical Cooperation Program by the Joint Tri-Service Electronic Warfare Panel, and by the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS). Formal requirements documents submitted by each Service are reviewed also by other Services. Projects in this Program Element (PE) are a continuation of successful progams initiated in PE 6.37.11.

C. WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, MO; US Army Electronics Research and Development Command (ERADCOM), Electronic Warfare Laboratory, Fort Monmouth, NJ; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NH; ITT Corporation, Nutley, NJ; TRACOR, Inc., Austin, TX; Calspan Corporation, Buffalo, NY; Loral, Inc., Yonkers, NJ; American Electronics Laboratory, Lansdale, PA; Bell Helicopter International, Fort Worth, TX.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The M130 chaff/flare dispenser completed ED and entered production in 1977. The AN/ALQ-144 infrared (IR) Jammer successfully completed engineering development and the validation in-process review (IPR) was approved for production in 1978. The ED contract for the AN/ALQ-136 radar jammer was awarded December, 1976. The AN/ALQ-136 is a lightweight radar jammer designed primarily for helicopter application to counter threat radars associated with the ZSU-23-4 air defense gun and SA-8 missile. ED was initiated on the AN/ALQ-156 missile warning detector system, a lightweight pulse doppler radar that detects the approach of a missile and automatically dispenses an IR flare decoy. A full scale ED contract was awarded in January, 1977 for the AN/APR-39(V)2, a replacement processor for threat recognition and discrimination permitting successful operation in an electronic environment more complex than that for which the AN/APR-39(V)1 Radar Warning Receiver is designed.

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

2. FY 1979 Program: The FY79 program continues the required developments for the incremental funding of on-going Engineering Development (ED) programs: The AN/APR-39(V)2 radar warning receiver for the Special Electronic Mission Aircraft (SEMA), AH-64, UH-60 BLACK HAWK, and the Navy; the ALQ-156 missile detector system (used with the M130 flare dispenser) for SEMA aircraft and the CH-47; the AN/ALQ-136(V)1 radar jammer for attack helicopters. ED starts for the AN/ALQ-162, continuous wave (CW) jammer, and the AN/ALQ-136(V)2 airborne interceptor radar jammer for SEMA.

3. FY 1980 Planned Program: The principal efforts under this program will be to complete/continue the on-going contractual development, integration, and testing for the AN/ALQ-156 missile detector system, the AN/ALQ-162 continuous wave (CW) jammers, and the AN/ALQ-136(V)2 advanced radar jammer, which are being developed to meet requirements for Special Electronic Mission Aircraft (SEMA) to counter threat airborne interceptors. These requirements have been clearly identified in the US Army Special Electronic Mission Aircraft Survivability and Mission Accomplishments Trade-off Analysis (SEE SAFE).

4. FY 1981 Planned Program: ED efforts will be substantially completed for the AN/ALQ-136(V)2 airborne interceptor radar jammer, the AN/ALQ-156 missile detector system and the AN/ALQ-162 CW radar jammer. Production validation testing is planned for the AN/APR-39(V)2 radar warning receiver, the AN/ALQ-156 missile detector system and the AN/ALQ-136(V)1 radar jammer. Engineering development starts for the advanced surface-to-air missile (SAM) jammer.

5. Program to Completion: The major effort will continue the advanced SAM jammer; and, since this is a continuing program, advanced developments will be transferred from Program Element #6.37.11.A, Aircraft EW Self-Protection Equipment, in response to stated user requirements and threat documentation. Requirements and threats are reviewed continually by the Aircraft Survivability Equipment (ASE) Permanent Steering Group (PSG). The ASE PSG members are drawn from the US Army Training Doctrine Command (TRADOC) and the US Army Materiel Development and Readiness Command (DARCOM) providing broad user and developer participation in all aspects of the aircraft survivability program which is key to increased mission effectiveness of Army aircraft, particularly attack helicopters and special electronic mission aircraft (SEMA).

6. Major Milestones: Not applicable.

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems

Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems

DOD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5725	6602	6778	6170	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	6355	6602	8066	-	Continuing	Not Applicable
Aircraft Procurement Army						
Funds (current requirements)	13357	28009	46627	39416	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	15929	26574	48066	-	Continuing	Not Applicable
Quantities (current requirements)	1028	1162	1718	1331	Continuing	Not Applicable
Quantities (as shown in FY 1979 submission)	873	875	2004	-	Continuing	Not Applicable

The major difference in RDTE funding for FY 1980 represents a delay in start of engineering development of advanced SAM jammer until FY 1981 (AD work is being accomplished under PE 67311/D653). The FY 1978 actual decrease ($630K) is a result of Service reprogramming to meet higher priority R&D projects within the materiel developing command. Procurement quantities include up to 14 different aircraft survivability items in support of 11 separate aircraft modification lines. Funding and quantity variations reflect changes in ASE applications to varying requirements in aircraft production/modification schedules.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.12.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Data System Interoperability
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2892	1500	6984	8100	Continuing	Not Applicable
D321	Joint Advanced Tactical C^3P (TACS/TADS)	2892	1500	0	0	0	28110
D323	USA TDS Interoperability	0	0	4984	8100	Continuing	Not Applicable
D324	USA/NATO TDS Interoperability	0	0	2000	0	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Tactical commanders have a requirement to be aware of the battlefield situation on a continuing near real-time basis. To satisfy this requirement, a large amount of data received from a variety of sources must be continuously obtained, processed, correlated and displayed. This activity demands that tactical automated systems have the capability to exchange information readily. This program supports the Army's efforts to achieve its goal of tactical data systems interoperability through the establishment of interfaces and the development of standards, procedures, and protocols. Project D324 includes the development of a system engineering plan and interoperability plan which will serve to guide all current and future US Army tactical data equipment/system design activities in satisfaction of the Culver Nunn Amendment which emphasizes the intent of Congress that equipment for US Forces in NATO should be standardized, or at least made interoperable, with that of other NATO nations to the maximum extent possible. Also included in this project is the development and implementation of an interoperability test program which will serve to verify and validate interoperability and standardization objectives between US Army and other NATO national armies' tactical data equipment/systems. Both the system engineering plan and the interoperability plan will be integrated as much as possible with counterpart plans at the Joint and Intra-Army levels. The program futher supports the Army's Tactical Data Systems Interoperability program (Project D323). The objective of this program is to increase the operational effectiveness of the Army's battlefield automated systems through interoperability. The development and implementation of this program not only satisfies an urgent need from an internal Army viewpoint, but also complements the Army's participation in Joint (JINTACCS) and NATO (RSI) interoperability programs. This program represents the initiation of the DARCOM activities as the Army's interoperability system engineer.

C. BASIS FOR FY 1980 RDTE REQUEST: USA/NATO TDS Interoperability: Funds requested in FY 1980 are required for contractual support in the development of a US Army/NATO tactical data systems engineering plan and interoperability plan. Included in this effort is the identification and technical assessment of NATO-agreed and US-endorsed interoperability requirements relative to tactical data equipment/systems. USA TDS Interop: FY80 funds are required to implement the Intra-Army Interoperability Program. Activities will include updating the Battlefield Interface Management Plan (BIMP), the Army Tactical Interface Design Plan (TIDP) and Technical Feasibility Analysis.

Program Element: #6.47.12.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Data System Interoperability
Budget Activity: #4 - Tactical Programs

Major Milestone	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
a. Publish Battlefield Interface Management Plan (BIMP)	FY79	FY79
b. Initiate Technical Interface Design Plan (TIDP's)	*FY79	FY80
c. Initiate Emulation	FY80	FY80
d. Initiate Interop Tests Teleprocessing Design Center (TDC)	*FY80	FY81
e. Initiate Sys Mods	*FY80	FY81
f. Initiate Compatibility and Interoperability (C&I) Tests Army Test Unit (ATU)	*FY81	FY82
g. Initiate Post Deploy Spt	FY81	----
h. Complete TIDP's	FY84	FY84
i. Complete Emulations	FY84	FY84
j. Complete Emulation C&I	FY84	FY84
k. Complete System Mods	*FY85	FY84
l. Complete ATU C&I	FY85	----

* Earlier starting dates for items b, d, e and f were a result of refining the program. Completion dates are unchanged. Item k is a year late because of an increase in the number of systems being modified.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	1300	1500	1000	Continuing	Not Applicable

Increased funding level in FY 1980 represents initiation of the Tactical Data System (TDS) interoperability, Program Element 6.47.12.A - D323, and US Army/NATO TDS Interoperability Project D324.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.12.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Data System Interoperability
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION:

USA/NATO TDS Interoperability: With a view toward strengthening the North Atlantic Alliance, the Culver-Nunn Amendment of 1975 emphasized the intent of the Congress that equipment for US Forces in NATO should be standardized or at least made interoperable with that of other NATO nations to the maximum extent possible. In contrast, various decentralized, on-going, planned, and inter-related US Army tactical data system projects heretofore have focused minimal attention on operational/technical characteristics/requirements of other NATO national tactical data systems, as well as to optimize commonality, standardization and operational effectiveness in the long-term. In order to realize these objectives, it is essential that system engineering design controls be applied to on-going and planned US Army tactical data system projects concurrently with the development of a system engineering plan and interoperability plan. This approach will serve to guide all current/future US Army tactical data equipment/system design activity in satisfaction of the Congressional mandate, so as to maximize the operational effectivenss of combined NATO national tactical forces deployments.

USA TDS Interop: The objective of this program is to increase the operational effectiveness of the Army's battlefield automated systems through interoperability. A systems approach to automation interoperability engineering will be employed to accomplish the necessary materiel developer (Systems Engineer) actions during the interoperability development phases of: interoperability concept definition, technical interface design planning, system modifications, interoperability testing, configuration management, and post deployment support. The development and implementation of this program not only satisfies an urgent need from an internal Army viewpoint, but also provides a basis of support for the Army's participation in Joint (JINTACCS) and NATO (RSI) interoperability programs. Activities in the area of interoperability have already taken place and provide the Army with a solid basis from which to launch into a comprehensive automation interoperability engineering effort. The most effective approach to resolving this problem is through an Architect-System Engineer relationship between TRADOC and DARCOM. TRADOC is already well on its way to implementing the role of Architect and has established a 50-man office (The Battlefield Automation Management Directorate) at the Ft Leavenworth Combined Army Combat Development Activity.

G. RELATED ACTIVITIES:

Joint Interoperability of Tactical Command and Control Systems (JINTACCS), P.E. 6.47.79.A-D309, has been established to improve the overall tactical effectiveness of the US Armed Forces in joint battlefield operations by ensuring compatibility and interoperability among the joint services/agencies operational facilities and their supporting command and control computer systems. In the first quarter of FY 1981 (October 1980), the TACS/TADS program will be transitioned into the JINTACCS program for configuration management and the TACS/TADS test bed will be managed by the JINTACCS Joint Interface Test Force (JITF) at Ft Monmouth, NJ.

Division Air Defense Command, Control, and Communications System (DIVAD C^3), P.E. 6.37.40.A-D593 has been established to satisfy an urgent requirement for a division level air defense system with high mobility, shoot-on-the-move capability, and improved target acquisition and coordination. Interoperability of the DIVAD C^3 system with TACS/TADS program system will improve friendly air ground force safety and defense.

H. WORK PERFORMED BY: USA TDS Interop and USA/NATO TDS, Interoperability: To date, these projects have been unfunded; therefore, no contractual effort has been initiated. Significant contractual effort will be required once these programs start.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The baseline Army system participating in the TACS/TADS program, Missile Minder (AN/TSQ-73) - Operational Test III Version, has been reconfigured to be compatible and interoperable with other service TACS/TADS systems. Complete documentation (Technical Interface Concepts, Technical Interface Design Plans, Interface Operating Procedures, System Specifications, Management Plans, Test Plans, Test Procedures, Operational Effectiveness Demonstration Plans) has been developed, training has been accomplished, interface tests have been conducted, and Operational Effectiveness Demonstrations (OED) have been performed. After the OED, the Missile Minder system at Van Nuys, California has been modified and connected to reflect new operational requirements. The Missile Minder will be sent to the test bed at Ft. Bliss, Texas for continuing maintenance and updating in FY 1979 (October 1978). Plans for transition of configuration management to the JINTACCS program were initiated.

2. FY 1979 Program: Installation of the Missile Minder system to Ft. Bliss, Texas for continued configuration management has been accomplished. Contractual support has been acquired to maintain the software. Participation in TACS/TADS tests and an Operational Effectiveness Demonstration will be continued to evaluate operational requirements modifications. Updating of the plan for TACS/TADS transition to the JINTACCS program will be continued. Initial modification of a Missile Minder version to incorporate JINTACCS standards will begin in preparation for JINTACCS Compatibility and Interoperability (C&I) testing.

3. FY 1980 Planned Program: The Battlefield Interface Management Plan (BIMP) will be updated to incorporate requirements which are in the ABIC-79. The key system listing and Army interface standards and communications interface standards will be completed. The Army Technical Interface Design Plan (TIDP) and Technical Feasibility Analysis will be updated to reflect new/modified user interoperability requirements. The 10 system-to-system TIDP's initiated in FY79 will be finalized. Five additional system-to-system TIDP's will be initiated for the user prioritized interoperability requirements. A program of Compatibility and Interoperability (C&I) testing will be initiated both at the Teleprocessing Design Center (TDC) for emulation and the Army Test Unit (ATU) for real world testing of selected interoperability requirements. Also required system modifications will be documented for 9 systems. The identification and technical assessment of NATO-agreed and US-endorsed interoperability requirements relative to tactical data equipment/systems will form the basis for the initial development of a US Army/NATO tactical data systems engineering plan and interoperability plan. These plans in addition to guiding all current and future US Army tactical data equipment/systems design activity in accordance with NATO requirements and agreements, will include discrete arrangements between the US and UK to ensure compatibility and interoperability between the US TACFIRE System and

the functionally equivalent UK Bates System, as well as the envisioned US TOS System and the envisioned UK WAVELL System. These projected arrangements will take into consideration any existing technical arrangements between the US and GE relative to the TACFIRE-ADLER artillery automatic data processing interface, and the TOS-FGSH interface.

4. FY 1981 Planned Program: Previous iterative documents will be updated to reflect current user interoperability requirements (BIMP, A-TIDP, and Tech Feasibility Analysis). The 10 system-to-system TIDP's completed in FY80 will be updated and configuration managed, and five system-to-system TIDP's are scheduled to be finalized. Systems already emulated at the TDC will be updated, and emulated C&I testing will be initiated at the TDC for the 5 interfaces. Full-scale programed efforts in support of the US Army/NATO tactical data systems engineering plan and interoperability plan initiated in FY80 will be developed. Determinations will be made relative to the extent, composition, and schedule of an interoperability test program in support of the systems engineering/interoperability plan. Close coordination with GE and the UK, as well as the Joint Advanced Tactical Command & Control and Communications Program (TACS/TADS), the US Army Tactical Data Systems Interoperability Program, and the Joint Integrated Tactical Command & Control Systems (JINTACCS) Program is planned so that technical synchronism will be maintained between US Army/NATO tactical data systems requirements and developments and the US Joint Service requirements and developments. Funds will be requested in 1981 to continue NATO Interoperability.

5. Program to Completion: Completion of the US Army/NATO tactical data systems engineering plan and interoperability plan. Full scale, interoperability testing between US, GE, and UK Armies tactical data systems by emulation techniques (or actual systems) in accordance with technical guidelines of the systems engineering plan and interoperability plan and the interoperability test program. Between now and 1985 is best characterized as a period of "catch up." Interoperability architecture and interoperability engineering implementation programs have yet to be established for the battlefield automation systems that are known today. By 1985 this program will have provided the required automation interoperability engineering necessary for today's developing systems.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.14.A
DoD Mission Area: #442 - Logistics/General Combat Support

Title: Tactical Electric Power Sources
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	150	3027	5095	5850	Continuing	Not Applicable
	Quantities						Not Applicable
D194	Engine Driven Generators	150	0	750	2450	Continuing	Not Applicable
D196	Silent Power Generating Sources	0	3027	4345	3400	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Army requires new and advanced tactical electric power generation and associated power conditioning and control equipment to meet general purpose, special purpose, or precision power applications that cannot be satisfied by existing items. Current engine-driven generators, particularly in the power range of 0.5 Kilowatt (KW) to 10 KW, have low power efficiency, are noisy, emit heat (infrared) signatures, are heavy and bulky, require excessive maintenance, and are not fuel efficient. This program will provide the Army with advanced state-of-the-art tactical power generation equipment to achieve major benefits with respect to mobility, noise and heat signature reduction, increased power efficiency, reduction in fuel consumption, commonality of components, standardization to reduce number of different types of generators, and provide multi-fuel and/or non-fossil fuel capabilies. Mobile tactical generators are vital to the operation of critical weapons, and command and control systems. If advanced power generation equipment is not developed on a timely basis, the Army will be forced to use less reliable generators which will degrade effectiveness of supported combat systems.

C. BASIS FOR FY 1980 RDTE REQUEST: Funding is required to continue engineering development of a 1.5 Kilowatt (KW) methanol fuel cell member of a family of silent power generation equipment. Key milestones for the 1.5 KW fuel cell are:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Complete test model design/fabrication	4th Qtr 80	4th Qtr 80
Complete development and operational tests	1st Qtr 82	1st Qtr 82
Development acceptance in-process-review	3d Qtr 82	3d Qtr 82

All funding in FY 1979 is subject to reprograming to a higher priority unfunded requirement which would delay these milestones by one year.

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	150	3027	7966	Continuing	Not Applicable

FY 1980 decrease in required funds reflects a postponement of effort on improving fuel efficiency on the 30 KW GTED generator and work on the 10 KW 400 Hz GTED generator.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army: Item: Generator Set, GTED, 10 KW, 60 Hz						
Funds (current requirements)	8600	0	0	12600	84704	102804
Funds (as shown in FY 1979 submission)	8600	0	9500	--	51000	69100
Quantities (current requirements)	229	0	0	485	1931	2393
Quantities (as shown in FY 1979 submission)	229	0	233	--	1165	1627

The FY 1980 procurement request was deferred as a result of additional test requirements.

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: This program supports development of power generation and related equipment to satisfy the Army's requirements for efficient tactical mobile electric power. Items of power generation equipment developed under this program are considered as individual systems within the Army and have general purpose application. The program provides the major development thrust toward achieving Department of Defense goals for maximum standardization of power generation equipment with attendant benefits of commonality of components, reduced logistics support requirements, and lower life cycle costs. The program encompasses the development, within the prescribed Department of Defense family of generators, of engine-driven generators (gasoline, diesel, gas turbine, and other advanced combustion engine sets), fuel cell silent power, and power conditioning devices. Objectives of the program are to develop generator sets which are lighter weight for increased mobility, lower in life cycle costs, more fuel economical, quieter, longer in life and higher in reliability.

G. RELATED ACTIVITIES: The Army maintains continuing coordination with the other services through the Department of Defense Project Manager for Mobile Electric Power, structured with Army as the lead Service; and with other agencies such as the Department of Energy. Related basic research is conducted in Program Element 6.11.02.A, Project AH47, Electronic Devices Research, and Project AH51, Combat Support. Exploratory development is conducted in Program Element 6.27.33.A, Mobility Equipment Technology. Advanced development is conducted in Program Element 6.37.02.A, Electric Power Sources.

H. WORK PERFORMED BY: In-house effort and contract monitoring is performed by US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors will be selected in FY 1980, with total contract amount estimated to be $2.5 million.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: As part of prior Army power generation programs, standard Department of Defense families of diesel engine-driven and gasoline engine-driven generators ranging from 0.5 Kilowatt (KW) to 200 KW were developed. Engineer design tests, configuration planning, and drawings were completed for a 10 KW, 60 Hertz (Hz) gas turbine engine-driven generator. Test models of the 10 KW, 60 Hz generator have been fabricated and a combined Development Test II/Operational Test II (DT II/OT II) conducted.

2. FY 1979 Program: Complete Development Test II/Operational Test II (DT IIA/OT IIA) of the 10 Kilowatt (KW), 60 Hertz (Hz) turbine generator, to reassess reliability conduct development acceptance decision review, and prepare a technical data package for procurement. Contractual efforts will be initiated for the design and fabrication of engineering development (ED) of a 1.5 KW methanol fuel cell member of the Silent Lightweight Electrical Energy Plant (SLEEP) family. Efforts on the 1.5 KW fuel cell represent a new ED start in FY 1979.

3. FY 1980 Planned Program: Contractual efforts will be continued for the design and fabrication of engineering development test prototypes of a 1.5 KW methanol fuel cell. All necessary experimental work will have been performed and the proposed item will continue full scale development. The 1.5 KW fuel cell is the initial member of a required family of silent generators which

is vital to achieve quiet and lightweight power source capabilities for operating critical combat systems in the forward areas where mobility and reduced threat of detection is essential. Increase in funds from FY 1979 to FY 1980 is required to continue engineering development (ED) of the 1.5 KW fuel cell SLEEP family member and to initiate ED on a silencing enclosure for a 10 KW 60Hz turbine generator.

4. FY 1981 Planned Program: Fabrication of ED test prototypes of the 1.5 KW methanol fuel cell will be completed. ED will be initiated on: an advanced 15 KW turbine generator set utilizing ceramics components; and a 15 KW member of a family of general purpose power conditioners. All necessary experimental work will have been performed and the proposed items will be ready for full scale development.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.16.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Mapping and Geodesy
Budget Activity: #4 - Other Equipment

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2853	840	1539	1875	Continuing	Not Applicable
	QUANTITIES						
	Position and Azimuth Determining System						5
	Analytical Photogrammatic Positioning System						1
	Topographic Support System:						
	Interactive Graphics Equipment						3
	Analytical Plotter						3
D578	Field Army Surveying Equipment	1333	700	169	895	Continuing	Not Applicable
D579	Field Army Mapping Systems	1520	140	1370	980	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element addresses the engineering development and testing of materiel for rapid acquisition, processing, and dissemination of topographic map and position location data in the field Army in direct support of tactical deployment of forces and weapon system operation. The program element provides the necessary follow-on engineering development of the systems and equipments originating in Program Element 6.37.12.A, including the Position and Azimuth Determining System, and Field Army Topographic Support System. The work addresses the development of continually increasing Army requirements to generate and disseminate up-to-date general and special purpose maps of tactical areas which will enable commanders to use the terrain to their advantages against numerically superior forces, and to provide coordinates, elevations and azimuth quickly and accurately enough to allow artillery fire to be delivered for maximum effect.

C. BASIS FOR FY 1980 RDTE REQUEST: Begin development of Interactive Graphics Equipment and an Analytical (map) Plotter to provide the Topographic Support System (TSS) with a more rapid data processing capability than that provided by current commercial equipment. Begin development of the Advanced Analytical Photogrammetric Positioning System (AAPPS), and the near-real-time (NRT) exploitation system. The NRT will contain several items of video equipment for recording and displaying of live TV imagery transmitted from Remotely Piloted Vehicles (RPV), Artillery Launched Television (ALTV), and/or sensor platforms.

Program Element: #6.47.16.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Mapping and Geodesy
Budget Activity: #4 - Other Equipment

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Standardize Interactive Graphics Equipment	4Q FY 1984	Not Shown
Standardize Analytical Plotter	4Q FY 1984	Not Shown
Standardize Advanced Analytical Photogrammetric Positioning System (AAPPS)	4Q FY 1984	Not Shown

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	2853	840	925	Continuing	Not Applicable

The FY 1980 requirement has been increased because the US Army Training and Doctrine Command (TRADOC) has requested the addition of two developmental items to the system. These are the Interactive Graphics Equipment and the Analytical Plotter formerly known as the orthophoto production capability.

Program Element: #6.47.16.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Mapping and Geodesy
Budget Activity: #4 - Other Equipment

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Position and Azimuth Determining System:						
Funds (current requirements)	0	12300	14600*	14400	76100	117400
Funds (as shown in FY 1979 submission)	0	12300	12900	-	70100	95300
Quantities (current requirements)	0	9	60*	60	284	413
Quantities (as shown in FY 1979 submission)	0	9	57	-	286	352
Topographic Support System:						
Funds (current requirements)	0	18200	0	25800	81700	125700
Funds (as shown in FY 1979 submission)	0	18200	0	-	80000	98200
Quantities (current requirements)						9 Equivalent Systems
Quantities (as shown in FY 1979 submission)						

* Revised FY 1980 procurement profile is based on current assessment of production capability and current cost estimates.

Program Element: #6.47.16.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Mapping and Geodesy
Budget Activity: #4 - Other Equipment

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is the engineering development and testing of materiel for field Army survey and map compilation, revision, reproduction, and distribution. These developments will be used in direct support of the tactical deployment of forces and the operation of weapon systems. This program element provides the necessary engineering development of the systems and equipments originating in Program Element 6.37.12.A, Mapping and Geodesy. As a result of the formation of the Defense Mapping Agency (DMA) on 1 July 1972, this program element now only addresses the general areas of field Army surveying and mapping. The base plant related development efforts were transferred to the DMA on 1 July 1972 and the data on these efforts is now included in the DMA program submission. The systems retained in this program element include: (1) The Position and Azimuth Determining System (PADS), a palletized inertial survey platform for jeep or helicopter operation with mobile artillery and missile system to give realtime control accurate to 20 Meters (M) circular error probable (CEP) horizontally, 10M Probable Error (PE) vertically, and .01M in azimuth; (2) The Topographic Support System (TSS) which will modernize the field Army topographic battalions, which presently use World War II vintage equipment, so that they will be rapidly responsive in a highly mobile tactical environment; and (3) The Advanced Analytical Photogrammetric Positioning System (AAPPS) which will provide the field Army with the capability of determining coordinates of enemy target positions accurate to 25M horizontally and 15M vertically and of friendly positions to 10M CEP and Geodesy and Mapping (GM) veritically using photogrammetric techniques and advanced sensor imagery.

G. RELATED ACTIVITIES: The Army works directly with Air Force, Navy, and Marine Corps and under the coordination of the DMA and the Director, Defense Research and Engineering in the functional area of mapping, geodesy, and position location. Specific related program elements are as follows: DMA Program Element 6.37.01.B, Mapping, Charting and Geodesy Investigations and Prototype Development; DMA Program Element 6.47.01.B, Mapping, Charting, and Geodesy Engineering Development and Test; Army Program Element 6.27.07.A, Mapping and Geodesy; and the Army Program Element 6.37.12.A, Mapping and Geodesy.

H. WORK PERFORMED BY: This work is accomplished in-house at the US Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, VA; with assistance from other Army elements, and by contractorrs under USAETL direction. The contractors are: Motorola, Inc., Scottsdale, AZ; Lear Siegler, Inc., Santa Monica, CA; Bausch and Lomb, Rochester, NY; Litton Systems, Inc., Woodland Hills, CA; and Decilog, Inc., Melville, NY. All contracts exceed $25,000.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: In FY 1972, the Lightweight Gyro Azimuth Surveying Instrument was tested and type classified for troop use. This instrument automatically determines true north by sensing the earth's rotation. It replaces an instrument of 1955 vintage and is more accurate, less costly, lighter, more reliable, and easier to maintain than its predecessor. Development of an experimental Analytical Photogrammetric Positioning System to determine position coordinates of weapons system and potential targets for missile and tube artillery was also initiated. In FY 1973, development and testing of the experimental

Analytical Photogrammetric Positioning System was completed and the system was type classified. In FY 1974, development of the Topographic Support System (TSS) was initiated. In FY 1975, the Long Range Position Determining System was tested. System performance was found to be marginal and a decision was made to terminate development. Development of the Position and Azimuth Determining System was initiated. In FY 1977, fabrication of the Position and Azimuth Determining System was completed and system Development Test II/Operational Test II (DT II/OT II) started. Some reliability deficiencies were discovered and corrective action was taken by the contractor. The system was retested in FY 1978 and was found satisfactory. Selection of off-the-shelf components for the Topographic Support System was also completed.

2. FY 1979 Program: The Position and Azimuth Determining System will be type classified. Environmental testing of the system will be completed. The Topographic Support System will be type classified. Procurement funds will be used to buy the first system.

3. FY 1980 Planned Program: Development of Interactive Graphics Equipment and an Analytical Plotter for addition to the Topographic Support System will begin. Required Operational Capability (ROC) approval for engineering development of the Advanced Analytical Photogrammetric Positioning System will be obtained. All necessary experimental work will be performed and the proposed system will be ready for full scale development.

4. FY 1981 Planned Program: Concept validation in-process reviews will be held for the Advanced Analytical Photogrammetric Positioning System and for the Topographic Support System Analytical Plotter and Interactive Graphics Equipment. Contracts will be awarded for development of DT II/OT II prototypes of all three items.

5. Program to Completion: This is a continuing program. Development and testing of the Advanced Analytical Photogrammetric Positioning System and the Topographic Support System Analytical Plotter and Interactive Graphics Equipment will be completed in FY 1984 and they will be standardized. Development effort will begin in FY 1983 on a system for Tactical Exploitation of Digital Elevation Data and a Quick Response Multicolor Printer. In FY 1984, development of Forward Area Survey Equipment, a Miniaturized Gyrocompass, and an Advanced Map Updating Capability will start. Development and testing of the system for Tactical Exploitation of Digital Elevation Data will be completed and the system will be type classified. In FY 1985, development of an Advanced Distance Measuring Device, an Integrated Surveying Instrument, and a Factor Map Synthesizer will begin.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.17.A
DoD Mission Area: #442 - Logistics/General Combat Support

Title: General Combat Support
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3279	6186	5777	10266	Continuing	Not Applicable
DH01	Combat Engineer Equipment	702	0	765	2274	Continuing	Not Applicable
DH14	Container Distribution Equipment	0	1031	550	450	Continuing	Not Applicable
DL17	Camouflage	1	85	853	1323	Continuing	Not Applicable
DL39	General Support Equipment	1363	2450	1950	2657	Continuing	Not Applicable
DL41	Fuels Handling Equipment Systems	121	1172	0	1345	Continuing	Not Applicable
D429	Tactical Rigid-Wall Shelters	419	725	900	1200	Continuing	Not Applicable
D461	Marine Oriented Logistics Equipment	0	0	0	200	Continuing	Not Applicable
D832	Combat Medical Materiel	673	723	759	817	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army requires new and advanced logistical support equipment to meet the requirements of ship-to-shore and over-the-beach resupply operations, as well as the requirements of deployed forces in support of various military contingencies. In the event that port facilities are unavailable, commercial containerships and fuel tankers must be assisted by military equipment capable of off-loading, transporting, and handling containerized supplies and bulk fuel. A primary objective of this element is to provide equipment for logistics resupply. This program also provides the Army with materiel that will increase the Army's tactical mobility and reduce the burden of logistic resupply through: a new family of tactical shelters to replace the myriad of vans and shelters now protecting sophisticated electronic equipment, new water purification equipment that can provide potable water more efficiently than can existing equipment, new equipment for handling fuel more effectively from the tanker to the ultimate user in the forward area, new and more efficient environmental control equipment (heating/air-conditioning), and enhanced survivability via new camouflage techniques to defeat enemy surveillance threat. New and improved field casualty treatment systems vital for maintaining combat strength are also developed and tested under this program.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds are necessary to perform engineering development (ED) and testing of new and improved equipment for tactical bridging; handling of containerized cargo; purification of fresh, sea, or brackish waters which have been contaminated by chemical, biological, or radiological agents; space heaters with greater safety; countersurveillance; fuel handling; tactical shelters; logistics-over-the-shore; and field medical support in a combat environment.

Program Element: #6.47.17.A Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	3468	6186	10912	Continuing	Not Applicable

The FY 78 reduction was due to deletion of funds from the camouflage project because of a lack of firm requirements. The FY 80 reduction is due to delay in the initiation of Engineering Development (ED) for Bridging for 1985 and Beyond in order to resolve technical problems with the prototypes and allow time to resolve national policy matters with the participating nations; and a realignment of the Fuel Handling Equipment Systems, with revised item priorities and milestones that preclude conduct of ED in FY 80.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Ribbon Bridge Erection Boat:						
Funds (current requirements)	13000	0	0	7700	57500	78200 1/
Funds (as shown in FY 1979 submission)	13000	0	10200	-	30500	53700
Quantities (current requirements)	200	0	0	100	668	968 1/
Quantities (as shown in FY 1979 submission)	200	0	130	-	531	861
Water Purification Unit 600 gal/hr						
Funds (current requirements)	4000	0	1900	0	200	6100 2/
Funds (as shown in FY 1979 submission)	1800	0	0	-	0	1800
Quantities (current requirements)	30	0	11	0	1	42 2/
Quantities (as shown in FY 1979 submission)	30	0	0	-	0	30

Program Element: #6.47.17.A
DoD Mission Area: #442 - Logistics/General Combat Support

Title: General Combat Support
Budget Activity: #4 - Tactical Programs

1/ The ribbon bridge erection boat (RBEB) has been delayed due to test failures. Now the RBEB is expected to be type classified in FY 1980. At that time procurement in quantity can begin.

2/ The cost of the water purification unit was estimated too low in FY 1979 Congressional Descriptive Summary. The new cost is a more realistic figure. The unit should be type classified in May 1979 at which time a contract will be awarded using FY 78 funds with an option to cover the FY 1980 program.

Program Element: #6.47.17.A Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program element supports the engineering development (ED) of various items of equipment to meet the Army's needs in countersurveillance, logistics, mobility, countermobility, survivability, and medical care. New or improved logistics resupply equipment are required to provide the Army with a capability to move increasing volumes of containerized cargo and fuel vital to support Army forces engaged in a combat mission.

G. RELATED ACTIVITIES: Close coordination is maintained with other Services through the Joint Service Civil Engineering Research and Development Coordinating Group, the Joint Committee on Tactical Shelters, the Joint Medical Research Committee, the Joint Container Steering Group, and the Project Manager for Army Container Oriented Distribution Systems. The projects of this element contain items and systems that have progressed to engineering development from related advanced development Program Elements 6.37.26.A, Combat Support Equipment, and 6.37.32.A, Combat Medical Materiel. Related exploratory development program elements include 6.27.23.A, Clothing, Equipment, and Shelter Technology; 6.27.33.A, Mobility Equipment Technology; and 6.27.78.A, Combat Medical Materiel. In FY 1981 the trilateral, United States, United Kingdom and Federal Republic of Germany (US-UK-FRG) Bridging for 1985 and Beyond program will enter engineering development. A trilateral steering committee directs this NATO standardization/interoperability effort.

H. WORK PERFORMED BY: In-house work is performed at the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA; US Army Natick Research and Development Command, Natick, MA; and the Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, MD. Contracts include ROTORK, United Kingdom; Brunswick Corporation, Marion, VA; Parson Company, Stockton, CA; Energy Transformation Corporation, Boyertown, PA; American Science and Engineering, Incorporated, Boston, MA; Value Engineering Company, Alexandria, VA; UOP Corporation, San Diego, CA; Eidel Manufacturing Company, Albuquerque, NM, and additional proposed contracts estimated to cost $2,250,000.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Fabricated two new 600/150 gallons per hour (GPH) reverse osmosis water purification units (ROWPU) and started retesting at Fort Bragg, NC. Started fabrication of test hardware for Development Test II/Operational Test II (DT II/OT II) and test planning for the 250,000 British Thermal Units per hour (BTUH) multifuel heater. Awarded a contract to develop the One-Side Expandable ISO (International Organization for Standardization) Container Shelter and fabricated two prototypes for engineering tests. Reviewed and formulated new requirements based on the efforts of the Technical Working Group (TWG) of Joint Committee on Tactical Shelters (JOCOTAS). The Marine Corps shelters were delivered and tested by the Army against the criteria established in the coordinated test plan. Type classified US Army leg splint and case, completed DT II and OT Tests for emergency sterilizer, completed OT II testing on field optometry set, completed DT II and OT II on hypodermic apparatus, type classified dental equipment set and canine shipping container, evaluated prototype of cold injury rapid rewarmer, and completed OT II on environmental protection container for medical supplies.

2. FY 1979 Program: Initiate Engineering Development (ED) of inflatable decoys for HAWK air defense system and a camouflage support system for self-propelled artillery. Complete fabrication of Development Test II/Operational Test II (DT II/OT II hardware for 250,000 British Thermal Units per hour (BTUH) heater and conduct physical teardown evaluation and review. Award contract for fabrication of two 3000/2000 GPH ROWPU for testing. Complete testing and type classify the 600/150 GPH ROWPU. Initiate phase II of contract for One-Side Expandable ISO shelter to provide four additional shelters for DT II//OT II. Convene a special IPR upon receipt of the Army test results of the Marine Corps small shelters. Finalize the DOD shelter design parameters and initiate standard tests to check parameters in conjunction with the TWG of JOCOTAS. Complete OT test of patient holding and evacuation system. Type classify the emergency sterilizer, field optometry set, veterinary hypodermic injection apparatus, the environmental protection container for medical supplies, and the dental chair and operating unit. Complete DT and OT testing on Pesticide Dispersal Unit, Helicopter Mounted and Mosquito Light Trap. Funds shown for Projects DH14 and DL41 and others may be reprogramed to higher priority projects.

3. FY 1980 Planned Program: Start final design of components selected and agreed upon for development of a tactical bridging system for the 1985-1995 time frame. Establish a trilateral management office to support the international agreement on bridging to be shared by FRG, UK, and US. Complete development and type classify the Ribbon Bridge erection boat. Provide HAWK Air Defense System (ADS) decoys for DT II testing. Prepare tech data package for artillery camouflage support system. Conduct DT II of 250,000 BTUH heater. Prepare skill performance aids for the testing of the 3000/2000 GPH ROWPU and conduct DT II testing. Award a design and fabrication contract for test hardware for the 15,000 and 60,000 BTUH heaters. Conduct development acceptance IPR and type classify two-for-one expandable rigid wall shelter. Continue ED on 20-foot, nonexpandable, rigid-wall shelter. Initiate ED and testing of selective blood screening device, personnel/patient decontamination set, field micro-dose x-ray and laboratory equipment, Aidman Medical Set, Backpack Pesticide Dispersal Unit, and Pesticide Dispersal Unit, Helicopter, Liquid. Prepare technical data package and type classify the Liner, Heater, Patient Holding and Evacuation System.

4. FY 1981 Planned Program: Initiate ED and testing of Tactical Bridging for the FY 85-89 timeframe and access/egress hardware for current inventory bridging. Begin ED of prestaged loading system for containerized ammunition. Type classify the HAWK ADS decoys, the camouflage support system for self-propelled howitzers, and the 250,000 BTUH heater. Complete DT II/OT II testing of 3000/2000 GPH ROWPU. Begin ED of rapidly emplaced pipeline system, 3-for-1 expandable rigid-wall shelter, and rapidly deployable/knockdown (sectionalized) barge. Conduct DT II/OT II on 20-foot, nonexpandable, rigid-wall shelter. Continue DT II/OT II on selective blood screening device, patient decontamination set, and field x-ray equipment.

5. Program to Completion. This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1013	5400	4341	4730	Continuing	Not Applicable
	QUANTITIES						(Not Feasible to List)
DL82	Physical Security	1013	5400	4341	4730	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Objective is to conduct engineering development (ED) of a tri-Service family of physical security sensors, exterior lighting, barriers, and ancillary equipment that will operate worldwide, enabling military commanders to tailor physical security systems to protect assets, installations, bases, facilities, personnel, and the rear area of deployed forces. Physical security equipment is required to better protect critical areas including arms rooms and storage facilities. Significant manpower savings are practical when adequate detection systems are installed. Department of Defense uses more than 16,000 guard personnel daily. Development is directed toward satisfying requirements for a Facility Intrusion Detection System (FIDS) and for a Fixed Installation Exterior Perimeter Sensor System (FIEPSS). All developments are aimed at satisfying tri-Service requirements.

C. BASIS FOR FY 1980 RDTE REQUEST: Accomplish Army testing and evaluation of Development Test II/Operational Test II (DT II/OT II) Models of the Interim FIDS sensors, the sensor self-test subsystem, an audio surveillance device, and the control, communication, and display subsystem (CCDS). Individual components as well as an integrated system will be evaluated. Development Test II will be initiated at the Electronics Proving Ground, Fort Huachuca, AZ, and Operational Test II will be initiated at the Airborne, Communications, and Electronics Board, Fort Bragg, NC. Continue Engineering Development of the Advanced FIDS: video surveillance device, identification element, remote alarm displays, large and small CCDS, portable duress sensor, reconfigured Large Area Motion Sensor, physiological deterrent, and Base and Installation Security System (BISS) interface components, and initiate Engineering Development of the DoD lighting and barrier subsystem.

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	2813	5400	4341	Continuing	Not Applicable

FY 1978 difference is due to restructuring of this program. 200K was reprogramed to the 6.3 Physical Security program and 1600K to other higher priority programs. It is intended to reprogram 1600K into this program in FY 1979 in order to award a contract for DT/OT II models of the Interim FIDS.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	4300	10000	6000	10000	Continuing	Not Applicable

Procurement of Physical Security Equipment was not previously listed in this program element. The House Appropriations Committee directed all physical security equipment be procured under OPA starting in FY 1978.

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: Objective is to conduct all design, development, test, and evaluation required to field a complete, integrated physical security system to protect materiel, bases, facilities, installations, and personnel against theft, sabotage, and espionage. Developments will be directed towards satisfying the Army's Materiel Need (MN) for a Facility Intrusion Detection System (FIDS) and will fulfill the internal physical security requirements of all Department of Defense (DOD) elements. Approach is to develop: sensors, including penetration, motion, item removal, duress, and contraband; electronic data links, data link security supervisory components, and centralized data processing components; alarm displays, monitoring and readout components; physiological and/or psychological deterrent devices; devices to protect cargo in depots or in transit by truck, rail, or ship; standardized secure weapons containers, and locks and safes; and interfaces necessary to integrate exterior sensors developed by the Air Force and potential shipboard security equipment components adopted by the Navy. Development will also be directed toward satisfying the lighting and barriers requirements for all DOD elements.

G. RELATED ACTIVITIES: This program follows from Advanced Development Program Element 6.37.05.A, Physical Security. Related are the Army's type classified Joint-Services Interior Intrusion Detection System (J-SIIDS), the Army's Remotely Monitored Battlefield Security Sensor System (REMBASS) tactical sensor program, and the Air Force's Base and Installation Security System (BISS) exterior physical security program. Close coordination with REMBASS and BISS is being accomplished to assure utilization of related technologies and developments, and to prevent duplication of effort. Coordination is accomplished by membership on joint working groups and by attendance at interservice meetings. The DOD Physical Security Equipment Action Group monitors and coordinates the development and acquisition of physical security equipment by all Services. The Department of the Army single point of contact is the Project Officer for Physical Security Equipment (POPSE) who coordinates and monitors the development, acquisition, integrated logistic support, and installation of physical security systems.

H. WORK PERFORMED BY: The US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, is assigned responsibility for the Army's Physical Security RDTE. Other Government agencies involved are the US Army Test and Evaluation Command, Aberdeen, MD, and the US Army Natick Research and Development Command (NARADCOM), Natick, MA, for development of locks and secure containers. Major contracts are LaBarge Electronics Division, Tulsa, OK; GTE Sylvania, Mountainview, CA, and Aritech Inc., Boston, MA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Development of the Joint-Services Interior Intrusion Detection System (J-SIIDS) was initiated in December 1971 under the auspices of the Defense Special Projects Group (DSPG). In April 1972 responsibility was transferred from DSPG to Department of the Army. J-SIIDS components were type classified standard in May 1973 for use in arms rooms. Installation of the J-SIIDS was initiated in August 1976 and is continuing at the present time. Engineering Development (ED) of J-SIIDS add-on components designed to provide additional capabilities and more application flexibility was

initiated in June 1973. A Special In-Process Review was conducted in July 1976 to type classify the add-on components and to certify the Joint-Services Interior Intrusion Detection System (J-SIIDS) for use in areas other than arms rooms. During FY 1977, final preparations were made to conduct Development Test II/Operational Test II of the remaining J-SIIDS components, i.e., Data Transmission System Type II (a more secure data link) and intrinsically safe components (suitable for use in explosive atmospheres). Full scale development of the Facility Intrusion Detection System (FIDS) was authorized at a Concept Feasibility In-Process Review (IPR) conducted during June 1974. Contracts for Engineering Development Models of FIDS sensors and the Control, Communication, and Display Subsystem (CC&DS) were awarded during July 1974. The FIDS components were received in December 1975 and an in-house evaluation was conducted. Contracts were awarded in June 1976 for test models of the Passive Infrared Motion Sensor (PIMS) and CC&DS. During FY 1977, a FIDS CC&DS, J-SIIDS sensors, a sensor self-test subsystem, and a surveillance device were integrated into a system. During FY 1978, the FIDS test models were delivered for Army laboratory evaluation. Contract solicitations were issued for Development Test II/Operational Test II (DT II/OT II) models. Initial planning for DT II/OT II integrated FIDS systems was accomplished with the Army's Test and Evaluation, and Training and Doctrine Commands (TECOM and TRADOC). DT II/OT II of the J-SIIDS Data Transmission System Type II and Intrinsically safe components were started at Fort Huachuca, AZ, and Fort Bragg, NC. In addition, military and commercial exterior sensors were integrated into the system to demonstrate the adaptability and flexibility of the FIDS to meet all services requirements.

2. FY 1979 Program: A contract will be awarded for DT II/OT II models of the Interim FIDS including the following FIDS sensors: Ultrasonic Motion Sensor (UMS), Passive Ultrasonic Sensor (PUS), Passive Infrared Motion Sensor (SIMS), Vibration Sensor (VS), and Capacitance Proximity Sensor (CPS). Full scale development of advanced FIDS will be initiated with the procurement of the following engineering development (ED) models: video surveillance device, identification element interface cards, remote display capabilities, large and small CCDS, portable duress sensor, reconfigured Large Area Motion Sensor, physiological deterrent, and Base and Installation Security System (BISS) interface components.

3. FY 1980 Planned Program: DT II/OT II of the complete Interim FIDS consisting of intrusion sensors, a sensor self-test subsystem, a control, communication and display subsystem, and an audio surveillance device for protected areas will begin at Fort Huachuca, AZ, (DT) and Fort Bragg, NC, (OT). Full scale development will continue for the following advanced FIDS components: video surveillance device, identification element interface cards, remote display capabilities, large and small CCDS, portable duress sensor, reconfigured Large Area Motion Sensor, physiological deterrent, and BISS interface components. Compatability of visible and nonvisible lighting systems with surveillance systems will be determined and the capability of currently available interior/exterior barriers for physical security applications will be determined. The goal of this effort is to integrate and optimize existing sensor, barrier, and lighting systems. A Validation In-Process Review will be conducted for those lighting and barrier components showing minimal development risk. For all new starts, all necessary experimental work will have been performed and the proposed items will be ready for full scale development.

4. FY 1981 Planned Program: Development Test II/Operational Test II (DT II/OT II) of the Interim Facility Intrusion Detection System (FIDS) will be completed, and Type Classification will be accomplished. Development of Advanced FIDS components begun in FY 1979 will continue and DT II/OT II of the first group of Advanced FIDS models will be procured. Full scale development will be initiated for the following advanced FIDS components: a FIDS radio frequency (RF) data link, a covertly activated duress sensor, a contraband sensor, a response/deterrent subsystem and cargo security and locking devices. Development of lighting and barrier subsystem components begun in FY 1979 will continue and DT II/OT II models will be procured of those components entering full scale development in FY 1980.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.23.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Special Purpose Detectors
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1137	2327	99	151	None	Not Applicable
	QUANTITIES						Not Applicable
DL71	Low Energy Laser Devices	500	0	0	0	None	500
DL79	Information-Identification-Position Devices	637	2327	99	151	None	3214

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The tactical commander is expected to face a numerically superior, well trained and equipped enemy. In order to counter this threat, our commanders must have responsive force multipliers, such as responsive communications and timely, accurate and comprehensive intelligence information. Photography is one intelligence means by which the commander can "see the battlefield." This program is directed toward providing the commander with accurate and timely intelligence from aerial reconnaissance and surveillance sensors by providing equipment to rapidly process and reproduce reconnaissance and surveillance imagery and to automate image interpretation tasks. This program is also directed toward providing surveillance and target acquisition devices with an improved capability to locate and engage targets using both conventional and terminal homing munitions during all conditions of weather and visibility.

C. BASIS FOR FY 1980 RDTE REQUEST: The requested funds will permit continuation of engineering development of the Mobile Army Ground Imagery Interpretation Center (MAGIIC).

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	1637	2327	475	Continuing	Not Applicable

The 1979 and 1980 funding profiles differ because the operational requirement for the Tactical Imagery Processing System (TIPS) was reexamined and determined to be invalid. The change in direction was driven by new information from the Air Force indicating that the volume of photographic film to be provided to the Army would be far less than originally estimated. Since the

requirement for Tactical Imagery Processing System (TIPS) was based upon the high volume of imagery, the project was terminated. The current request reflects certain system integration and life cycle support costs associated with fielding of Mobile Army Ground Imagery Interpretation Centers (MAGIIC).

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement Army:						
Funds (current requirements)	25500	0	5800	0	To be determined	To be determined
Funds (as shown in FY 1979 submission)	25500	0	36200	-	To be determined	To be determined
Quantities (current requirements)	5	0	1	0	To be determined	To be determined
Quantities (as shown in FY 1979	5	0	6	-	Continuing	Not Applicable

The FY80 procurement figures differ because the operational requirement for MAGIIC) was reexamined and the original quantity of 21 full systems was found to be invalid. A joint Army, Air Force tactical reconnaissance study showed that full MAGIIC systems were not required at the Corps instrumented airfields nor were they required at Air Force tactical reconnaaissance squadrons. For this reason, the quantity of full MAGIIC systems was reduced from 21 to 7 and funds were reduced accordingly. Six of the seven systems were purchased with FY78 funds and the FY80 funds will purchase the remainder. There may be a requirement for seven partial systems but this will not be known until 3QFY79.

Program Element: $6.47.23.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Special Purpose Detectors
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The Mobile Army Ground Imagery Interpretation Center (MAGIIC) is being procured for the Army by the Air Force under its Tactical Information Processing and Interpretation (TIPI) Program. The MAGIIC consists of automated light tables with associated optics, mensuration system, map and overlay display unit and a computer interface system for message input/output. The Army plans to buy the appropriate elements of the Air Force developed TIPI system with some sensor modifications to meet its MAGIIC requirements. Full Scale MAGIIC systems will be deployed at Corps headquarters. Partial systems may be deployed at Corps instrumented airfields to exploit reconnaissance photography from Air Force and Army sensor platforms.

G. RELATED ACTIVITIES: The US Navy and US Air Force utilize the same general technologies. Service and Department of Defense programs are closely coordinated through joint meetings and conferences, and multi-service use of the same devices and facilities. This program element is a follow-on to 6.37.19.A, Special Purpose Detectors. Procurement of the MAGIIC is performed by the USAF at Hanscom Air Force Base (AFB) as part of the TIPI procurement. US Marine Corps is also purchasing the equipment.

H. WORK PERFORMED BY: In-house is performed by the US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractors include: Texas Instruments, Dallas, TX, General Electric, Bedford, MA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The program to procure MAGIIC commenced in FY78. The Army requirements were to be satisfied by an add-on to an Air Force contract. Army requirements were identified, a Development Plan was written, the MAGIIC was type classified and the procurement contract was awarded. The Tactical Imagery Processing System (TIPS) system specifications were written and a contract was formulated for development of two engineering models.

2. FY 1979 Program: The operational requirement for the TIPS system was reviewed, found invalid and the program was terminated. $2215k in RDTE funds were reprogramed to satisfy higher priority requirements. Of the $126k remaining, $46k will be used for labor and overhead and the remaining $80k will be used to: (1) revise and refine the system life cycle cost estimate; (2) begin work on a System Deployment Planning Document; and (3) begin work on a Data Element Dictionary which is used to insure interoperability with the Tactical Operations System (the consumer of MAGIIC system's output).

3. FY 1980 Planned Program: Complete production of the System Deployment Planning Document and the Data Element Dictionary. Additionally, perform study as part of the Integrated Logistics Support plan for the system.

4. FY 1981 Planned Program: Continue studies associated with life cycle integrated logistics support of the MAGIIC system, to include definition of communications interfaces with other systems. Develop deployment plan and accomplish type classification actions for partial systems.

5. Program to Completion: This is a continuing program. Outyear requirements are under study.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.24.A
DOD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Biological Defense Material
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4218	3287	4495	3019	Continuing	Not Applicable
	Quantities						
	XM19 Alarm						50
	XM2 Sampler						45
DF45	Biological Defense Materiel	4218	3287	4495	3019	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the engineering development (ED) of protective materiel and equipment to warn of the presence of and to protect against a biological attack. Specifically, there is a military need for a rapid biological detection and warning system to provide US Forces with early warning of an approaching biological attack. Improvement of the biological detection and alarm capability is essential to maintenance of a totally integrated biological defense posture.

C. BASIS FOR FY 1980 RDTE REQUEST: Conduct prototype qualification test - government. Complete technical data package. Complete all tests required to prepare reports for formal evaluation of program effort.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	3686	3287	2678	Continuing	Not Applicable

The additional FY78 funds allowed procurement of additional prototype systems to develop a broader data base. The FY80 Budget request includes approximately $1 Million to support completion of all tests (FY80) required to prepare reports for formal evaluation of program effort/status. The FY79 submission did not include the cost of these tests.

E. OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: #6.47.24.A
DOD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Biological Defense Material
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop and type classify a first generation biological agent automatic point detection and warning system for Army field use. The scope of this project includes the development of the XM19 Alarm and the XM2 Sampler (components of the biological detection and warning system) for use as applicable to division and brigade organizations. The XM19 Alarm automatically detects biological agent aerosols by a chemiluminescent reaction. The XM2 Sampler collects samples of the aerosols for subsequent identification by designated medical laboratories.

G. RELATED ACTIVITIES: Many items of equipment suitable for chemical defense are also suitable for biological defense (e.g., protective shelters). Such items are developed in PE 6.47.25.A, Chemical Defense Materiel, and not duplicated here. The Army is responsible for its own chemical and biological defense items and for those that meet joint requirements of the Army and other Services.

H. WORK PERFORMED BY: In-house efforts are performed at the US Army Chemical Systems Laboratory, Edgewood, MD. Contracts with Bendix Corporation, Baltimore, MD; Stanford Research Institute, Menlo Park, CA; and Southern Research Institute, Birmingham, AL.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Initial engineering designs were completed and evaluated. Level 1 drawings and draft technical manuals were completed. Field, engineering and reliability tests were conducted and evaluated. All results except reliability tests were found satisfactory. All XM19 Alarm units were returned to the contractor for complete retrofit in preparation for remaining reliability tests. Field tests were performed on the XM19 Detector and XM2 Sampler outside Continental United States (OCONUS). Design improvements of the XM19 and XM2 continue to reduce unit cost in production and increase reliability. Refill kit designs were completed.

2. FY 1979 Program: The prototype development on the biological detection and warning system will be completed. The interim technical data package will be placed under formal configuration control. Fabrication of ten engineering test models will be initiated. Prototype qualification testing - contractor (PQT-C) will be initiated. Detailed planning of formal testing in developmental testing II/operational testing II (DT II/OT II) will be completed.

3. FY 1980 Planned Program: Prototype qualification testing - government will be conducted. Technical data package for developmental test II/operational test II will be completed. All tests required to prepare reports for formal evaluation of program efforts/progress will be completed.

Program Element: #6.47.24.A
DOD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Biological Defense Material
Budget Activity: #4 - Tactical Programs

4. FY 1981 Planned Program: Development acceptance - in process review (DEVA-IPR) and type classification (TC) of the Biological Detection and Warning System, XM19/XM2 will be accomplished. Formal testing will be initiated at Test and Evaluation Command (TECOM) test sites. First procurement actions will be initiated.

5. Program to Completion: The RDTE program on Biological Detection and Warning System, XM19/XM2 will be completed in FY81.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6021	10628	18725	24354	Continuing	Not Applicable
	Quantities						
	Mask, XM29						2850
	Liquid Agent Detector						1200
	Simulator, Projectile, Airburst, Liquid (SPAL)						800
DF97	Chemical Defense Materiel	0	0	4300	4630	Continuing	Not Applicable
D017	CB Collective Protection	0	90	200	2724	Continuing	Not Applicable
D019	Individual Chemical Protection	5150	8538	2680	3000	Continuing	Not Applicable
D020	Chemical Detection and Warning System	0	1600	785	5101	Continuing	Not Applicable
D022	Chemical Detection and Sampling Device	771	0	0	0	0	9790
D023	Collective Protection Materiel for Armored Vehicles	0	0	10160	6799	Continuing	Not Applicable
D138	Training System for Chemical Defense	100	400	600	2100	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective is to develop improved rapid detection and warning systems, chemical decontamination systems, and protective materiel and equipment, to warn of the presence of and to protect US Forces in a chemical warfare environment. The new mask provides improved respiratory protection with minimum burden to the user and maximum compatibility with individual clothing and equipment. The requirement for improved chemical detection, warning and identification materiel and equipment addresses the need to reduce the burden on the soldier while increasing his chances of survival in a chemical warfare environment. An improved decontamination system will provide US Forces the capability to remove or lower the hazards posed by chemical agents on the battlefield and thus, enhance our operational capability. There exists a need for collective protection for certain headquarters and communications functions and certain

armored vehicles and their crews in order to accomplish their assigned missions in an active chemical environment and to relieve the stresses and restrictions inherent in wearing individual protective clothing and equipment. The above improvements are essential to maintain a totally integrated chemical defense posture.

C. BASIS FOR FY 1980 RDTE REQUEST: Complete technical data package (TDP) on the XM29 Protective Mask and conduct additional design verification testing. Accomplish post type-classification activities (completion of tests, report writing) on the new mask. Conduct application/integration work on improved collective protection systems to satisfy collective protection requirements for shelters, selected armored vehicles and associated equipment. Conduct in-process review (IPR) leading to type classification (TC) of modular collective protection equipment (MCPE) for PATRIOT. Initiate Engineering Development (ED) on: decon station kit; clothing decon system; and interior surface decon system. Initiate ED on the chemical attack warning system (CAWS) after validation has been established in the Advanced Development (AD) program. Tech data package for CAWS and XM9 Detector Paper will be updated. The XM9 Detector Paper will be type classified. Complete Developmental Test II/Operational Test II, hold developer acceptance - in-process review, and type classify the Phase II training device.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimate Cost
RDTE					
Funds (as shown in FY 1979 submission)	4714	6128	10632	Continuing	Not Applicable

Increased funding was required in FY 1978 to support additional testing (optical, coating, etc.) of the XM29 Mask. Increased funding in FY79 will support additional requirements for CB defense. Increase funding is required in FY 1980 for the application/integration efforts on new/improved (Nuclear Biological-Chemical) NBC collective protection materiel for armored vehicles and the accelerated decontamination efforts. The collective protection effort is performed under a new project, PE: 6.57.27/D023, Collective Protection Materiel for Armored Vehicles.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army					
Funds (current requirements)	-	-	2800	98900	101700
Funds (as shown in FY 1979 submission)	-	-	2800	102000	104800

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Quantities (current requirements) (XM29 Mask)	-	-	22000	1056000	1078000
Quantities (as shown in FY 1979 submission)	-	-	22000	740000	762000

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct engineering development on defensive materiel and equipment to protect individuals from chemical agents by providing: protection from the respiratory system and body surface; manual and automatic detection and warning devices that respond to toxic agents in all forms on all surfaces; means to decontaminate skin, clothing, equipment, and terrain, and the development of collective protection materiel for shelters, vans and armored vehicles and their crews. Development of the new mask is in response to a Service requirement for improved respiratory protection with emphasis on improved operational capabilities and reduced logistical burden, suitability for wear under a wide range of operational conditions, and improved storage characteristics. Type classification of the mask will occur following successful completion of engineering development. Development of new/ improved decontamination materials and equipment, detection warning and identification equipment, and individual/collective protection is in response to a requirement to reduce the burden to the soldier while increasing his changes of survival in a chemical warfare environment. The above improvements are part of a broad program to correct deficiencies which would jeopardize the survivability of US Forces in an active chemical or biological (CB) environment.

G. RELATED ACTIVITIES: The approval of the memorandum of understanding (MOU) with Canada for protective mask canisters is pending. Conversion of the Army-approved required operational capability (ROC) for the new protective mask to a joint Service operational requirement for multi-Service application is complete. PE 6.27.06.A, "CB Defense and General Investigations", supports the entire Department of Defense (DOD) chemical and biological (CB) defense technology base and addresses in-depth exploratory activities in the development of a broad spectrum of CB defensive equipment concepts and is not duplicated in this program.

H. WORK PERFORMED BY: In-house effort by US Army Chemical Systems Laboratory, Edgewood, MD. Prime Contractors are Sierra Engineering Company, Sierra Madre, CA; Bendix Corporation, Baltimore, MD; D. H. Litter, New Yrok, NY; and Calspen Corporation, Buffalo, NY.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 78 and Prior Accomplishments: Developmental Test II was completed and a special in-process review was held on the liquid agent detector (LAD). Biomedical testing of B-1 dye (component of LAD) was completed and the data confirms that the dye is mutagenic. A modified safety protocal has been approved by the Surgeon General for use of the LAD in field testing. The New Protective Mask, XM29 entered the engineering development (ED) phase September 1977. A formal contract for the ED effort on the new mask has been awarded to Sierra Engineering Company. Final design was selected for the XM29 Mask. The improved airburst simulator entered ED.

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

2. FY 79 Program: Developmental Testing II/Operational Testing II (DT II/OT II) on the Protective Mask, XM 29 will be conducted. The technical data package will also be completed. Additionally, the developer acceptance in-process review will be accomplished and fabrication of production type test equipment will be initiated. Type classification is scheduled for 4QFY79. OT II will be initiated and completed on the XM9 Detector Paper. Studies on disposal of B-1 dye and XM9 Paper will be initiated. Engineering Development (ED) continued on an improved airburst simulator and a nonexplosive, portable bulk disseminator for nonpersistent agent simulant. These devices are known as Phase II Training Devices. Initiate ED or the chemical attack warning and transmission system (CAWTS). An accelerated program will be initiated to expedite prototype development and testing of decontamination equipment.

3. FY 80 Planned Program: Technical data package (TDP) on the New Protective Mask, XM29 will be completed. Additional design verification testing of the XM29 Mask will be conducted for all modes of operation with emphasis on the aviation mode. Updating of the TDP on the XM9 Detector Paper will be completed. Work on the disposal of the B-1 dye and XM9 Detector Paper will be completed. The XM9 Detector Paper will be type classified. Initiate design and construction of prototype (Nuclear, Biological-Chemical) NBC collective protection materiel and initiate integration/application efforts on those Congressional interest armored vehicles that will be in procurement or development in FY 81. Continue ED on the chemical attack warning and transmission system (CAWTS). Initiate ED on the Remote Sensing Chemical Agent Alarm, XM21. Engineering development will commence on the interior surface decon system and the decon system for clothing. All necessary experimental work will be performed on the above named systems (new starts) and said systems will be ready for full scale development.

4. FY 81 Planned Program: Initiate ED on the following: chemical alarm simulator, an improved Automatic Chemical Agent Alarm Unit, M42E1; detection and warning systems for combat vehicles, vans and shelters, the detector kit for chemical agents in water and the special applications decon system. All necessary experimental work will be performed on the above named systems (new starts) and said systems will be ready for full scale development. Continue ED on the Remote Chemical Agent Sensing Alarm, XM21. Additionally, ED will be initiated on the following training devices: an airburst disseminator, portable, nonexplosive ground disseminator for thickened agent simulant, and a Phase III training system (improved persistent and nonpersistent simulants).

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D023 — Title: Collective Protection Materiel - Armored Vehicles
Program Element: #6.47.25.A — Title: Chemical Defense Materiel
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Soviet Union continues to maintain a significant chemical warfare capability. The evidence is that they regard chemical weapons as an integral part of future tactical warfare. For example, they conduct extensive training exercises which stress operating proficiency in a chemical warfare protective posture and they have equipped their armored vehicles with collective protection systems. Other Warsaw Pact nations are similarly trained and equipped. To meet this threat, Congress directed in the FY 1978 DoD Appropriations Act (PL 95-79) that the Army prepare and fund a plan to provide nuclear-biological-chemical (NBC) protection for combat vehicles in development or procurement by 1981. Subsequently, enemy threat assessment and review of the Army's tactical doctrine for operating in a chemical contaminated environment resulted in an Army plan for providing NBC collective protection for operational as well as developmental combat vehicles and their crews. This program is structured to support these specified needs to improve the Army's survivability on the battlefield in a contaminated environment. Specifically, this program provides engineering development of new and improved collective protection equipment for armored vehicles. This goal will be achieved through the development of improved air purification systems which can be used for positive pressurization of the vehicle, if it is assigned a rear area mission, or in providing ventilated facepiece protection if it is assigned a forward area mission. The provision of the improved collective protection system will enable the crews to perform combat duties without the encumbrance of complete individual protective equipment when operating in an NBC contaminated environment.

B. RELATED ACTIVITIES: This is a new start in FY80. However, previous work has been done in this area in PE/Project: 6.37.21/D604, Collective Chemical Protection Materiel; 6.47.25/D017, CB Collective Protection; and 6.47.25/D018, Collective Protection - Vehicles and Vans. Foreign state-of-the-art will be considered throughout the RDTE cycle.

C. WORK PERFORMED BY: In-house work will be performed by Chemical Systems Laboratory, APG, MD. Contractors have yet to be determined.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: New start in FY 80.

2. FY 1979 Program: There is no work scheduled in FY 79.

Project: #D023 Title: Collective Protection Materiel - Armored Vehicles
Program Element: #6.47.25.A Title: Chemical Defense Materiel
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: Initiate design and construction of prototype NBC collective protection materiel and initial integration/application of those prototypes on the following nine armored vehicles anticipated to be in development or procurement in FY 81: (1) XM1 Tank, (2) Infantry Fighting Vehicles, (3) Calvary Fighting Vehicles, (4) General Support Rocket System, (5) Improved TOW Vehicle, (6) M577 Command Post Carrier, (7) M109 Self-Propelled Howitzer, (8) US ROLAND, and (9) Division Air Defense Gun.

4. FY 1981 Planned Program: Continue integration/application efforts on new/improved NBC collective protection materiel on those nine armored vehicles anticipated to be in development or procurement in FY 81.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0	0	10160	6799	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	Not applicable					

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8968	13627	13591	15100	Continuing	Not Applicable
	QUANTITIES						PLRS - 2 Master Units 64 User Units TDS - 14 BCS - 10 MFCC - 20
DC98	Position Locating Reporting System (PLRS)	6685	7400	8700	10600	10000	44857
DC99	Loran Manpack	57	0	0	0	0	1309
D183	Tactical Display System (TDS)	0	2911	3649	4500	Continuing	Not Applicable
D284	Battery Computer System (BCS)	2000	2316	1042	0	0	11542
A570	Mortar Fire Control Calculator (MFCC)	226	1000	200	0	0	1426

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Automated command and control equipment is being developed to provide the capability for processing the large volumes of data needed by commanders to make timely and accurate decisions on the highly mobile modern battlefield. This volume of data cannot be handled by present methods. The five systems covered in this program element include: (1) The Position Location Reporting System (PLRS) is a joint US Army and US Marine Corps development that will provide combat commanders in the 1980's with automatic near real time precise location of their field forces on the battlefield; provide reliable navigation information to friendly forces; and enhance the commander's ability to effectively control his maneuver elements. (2) The Tactical Display System (TDS) is needed to interact with data bases and present rapidly changing battlefield situations accurately and selectively while withstanding the battlefield environment. Automatic and selective display of up-to-date information speeds planning and operations over the current manual methods. The display is a one meter by one meter panel which presents tactical information graphically on a map background of the Commander's area of interest. (3) The Battery Computer System (BCS) is required to increase field artillery firing battery mission effectiveness. BCS reduces fire mission

response time through provision of individual weapon firing data to the guns. It permits greater battlefield survivability for the weapons by enabling better use of terrain protection without the current timeliness of fire penalty to calculate individual weapon fire commands and with improved target area efforts. The Battery Computer System (BCS) provides flexibility for battery operations with Tactical Fire Direction System (TACFIRE) or for battery autonomous operations. (4) The Mortar Fire Control Calculator (MFCC) is required to improve the accuracy and responsiveness of mortar fires by replacing manual computation of firing data by a small, rugged, battery-operated, hand-carried device to calculate data needed to orient 60mm, 81mm, and 4.2-inch mortars for firing.

C. BASIS FOR FY 1980 RDTE REQUEST: (1) Position Location Reporting System (PLRS): CORADCOM and external support efforts will be continued. Maintenance spares and batteries for user units of RDTE items will be purchased. Training for Operational Test II (OT II) will begin. The contractor will continue prototype fabrication and development of the master unit. Performance Qualification Test-Contractor (PQT-C) will be concluded and PQT-Government will begin with delivery of two master units and 64 user units. (2) The Tactical Display System (TDS) will be developed competitively utilizing technologies for which feasibility and validation has been proven. The Light Emitting Diode (LED) and Light Amplication Simulation Emission Radar (LASER) technologies will be incorporated in the display system development with emphasis directed at producibility, low cost, militarization, and system integration. (3) Battery Computer System (BCS) funding is to complete development and acceptance testing for first production articles. (4) Mortar Fire Control Calculator (MFCC) funding is to prepare for and conduct Development Test II and Operational Test II, to correct any test deficiencies, and to prepare for and conduct the Development Acceptance In-Process Review.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	8571	7227	12366	Continuing	Not Applicable

(1) The increase in the FY 1980 requirement for the Position Locating Reporting System (PLRS) is the result of technical difficulties in software development. (2) Tactical Display System (TDS) for FY 1979 planned for two approaches, Light Emitting Diode (LED) and Plasma Panel to enter full scale engineering development. Technical problems were encountered with the plasma approach and it is being terminated. Technical feasibility of the LED approach was established and the effort in FY 1979 is directed at producibility and militarization prior to entering full-scale development now scheduled for FY 1980. In lieu of the plasma technology, the Light Amplication Simulation Emission Radar (LASER) display approach is being further developed and

militarized in FY 1979. (4) The Mortar Fire Control Calculator (MFCC) program requirements reflect updated estimates of the engineering development costs and includes the FY 1978 initiation of in-house engineering and preparation for solicitation in early FY 1979.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Battery Computer System (BCS)						
Funds (current requirements)	0	0	16000	22000	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	0	3800	24300	-	87800	115900
Quantities (current requirements)	0	0	89	184	1042	1315
Quantities (as shown in FY 1979 submission)	0	33	210	-	717	960

The total estimated quantity has been expanded to show tht total requirement for BCS for Active Component forces, Reserve Component forces and war reserve support based upon 1984 force structure projections.

Program Element: #6.47.27.A Title: Command and Control
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: (1) The Position Locating and Reporting System (PLRS) employs a master unit located at or near the Division Command Post with an alternate master unit located near Division Artillery for 100% backup to ensure system survivability, and continuity of operations during rapid command post displacements. The truck or air transportable master unit provides the commander with computer controlled network management and dynamic situation display of 370 lightweight (15-17 lbs) user units in manpack, vehicle, and airborne configurations distributed throughout the division's combat maneuver and fire support elements. Each user unit automatically transmits a self-identifying signal burst on a precision time-ordered schedule, measures time-of-arrival of designated user unit transmissions and automatically relays these measurements to the master unit. The master unit computes and continuously updates the position of each user unit. Units equipped with the PLRS obtain their location coordinates, range and bearing to other friendly locations, the UTM coordinate locations of other user units, an alarm indication when entering a predesignated boundary area such as a mine field and the ability to exchange abbreviated digital data messages. The system is crypto-secure and offers a high degree of resistance to jamming and electronic vulnerability in a hostile electromagnetic environment. PLRS entered full-scale engineering in 1976. Two master units and 64 user units in various configurations are scheduled for delivery and government testing in FY 1980. The Development Acceptance In-Process Review (IPR) is scheduled for 4th Qtr FY81, and given a production decision, an Initial Operational Capability (IOC) of 4th Qtr FY83 is attainable. (2) The objective of the Tactical Display System (TDS) program is to develop a more effective means of displaying tactical situations in support of the Division Artillery, Battalion Fire Direction Centers, and in providing automated assistance to the Operations and Intelligence sections of tactical operation centers in Brigade, Division, and Corps. A specific objective is to replace the Digital Plotter Map and Electronic Tactical Display, correcting known inadequacies. These inadequacies are the lack of map background, lack of ability to interact with a data base, and consequent limitations on effective planning. (3) The Battery Computer System (BCS) program was initiated in FY 1976 to provide an improved technical fire control computational capability for field artillery firing batteries. The BCS will improve mission effectiveness in the target area and provide for independent or autonomous battery operations. It will perform ballistic computations for individual weapons, storage and application of nonstandard ballistic data, moving target prediction, and provide for interface with the Tactical Fire Direction System (TACFIRE) and two-way digital data communications with the TACFIRE Digital Message Device used by forward observers. The Battery Computer System (BCS) will be employed in all field artillery batteries including Reserve components. It will replace the obsolete Field Artillery Digital Automatic Computer (FADAC) and the TACFIRE Battery Display Unit in cannon batteries. In rocket and missile batteries the BCS will replace the FADAC and TACFIRE Variable Format Message Entry Device. The system will consist of a computer unit located at battery headquarters and a gun display unit for each battery weapon. (4) The Mortar Fire Control Calculator (MFCC) is needed to improve the accuracy and responsiveness of mortar fires by replacement of the present manual/graphical methods of computing firing data which are highly subject to error. The MFCC will be a small hand-carried unit which can be powered either by internal batteries or external sources. It will provide for input of meteorological data and interface with the Digital Message Device used by mortar and artillery forward observers.

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

G. RELATED ACTIVITIES: (1) The US Marine Corps is funding 40% of the Position Locating Reporting System (PLRS) development under Program Element 6.47.65.M, Other Marine Corps Development (Engineering). A 60/40 (US Army/US Marine Corps) sharing ratio will be applied to shared costs. The basic requirements and specifications for the PLRS are contained in a 1976 United States Army/United States Marine Corps (USA/USMC) Joint Service Operational Requirement. PLRS will interface with Command and Control Systems such as the Army's Tactical Operations System (TOS) and the USMC's Marine Integrated Fire and Air Support System (MIFASS) and Tactical Combat Operations System (TCO). (2) Advanced Development of the Tactical Display System (TDS) was begun as a joint cooperative research and development program in January 1975 with 50 percent of the funds provided by the Federal Republic of Germany (FRG) and 50 percent under PE 6.37.23.A (Integration of Army Tactical Data System). A Memorandum of Understanding between the US and the FRG is being negotiated to continue this development through full-scale development under the same 50/50 financial arrangement, where the US funds would be provided under PE 6.47.27.A. (3) The Battery Computer System (BCS) has application in the Tactical Fire Direction System (TACFIRE) program (PE 2.37.26.A) in that it is planned to replace the TACFIRE Battery Display Unit with the BCS. The Army and Marine Corps have signed a Memorandum of Agreement to develop a single battery computer unit which meets the requirements of both Services. (4) Exploratory development of the Mortar Fire Control Calculator (MFCC) was accomplished under PE 6.26.03.A (Armament Technology) with both Army and Marine Corps funding support.

H. WORK PERFORMED BY: The Army in-house developing organization responsible for the Position Location Reporting System (PLRS), the Tactical Display System (TDS) and the Battery Computer System (BCS) is the Project Manager, Army Tactical Data Systems (PM, ARTADS), US Army Communications Research and Development Command, Fort Monmouth, NJ. PLRS contractors performing tasks are: Hughes Aircraft Company, Fullerton, CA, and Telcom Systems, Incorporated, Arlington, VA. For the TDS Advanced Development prototyping contracts were awarded to Litton Data Systems, Van Nuys, CA, and Control Data Corporation, Minneapolis, MN. It is planned to continue Engineering Development prototyping with Litton Data Systems and to initiate the Light Amplication Simulation Emission Radar (LASER) display program with Electro-Spezial, a division of Philips, Bremen, West Germany. Battery Computer System (BCS) - Technical support is furnished by the US Army Computer Systems Command, Fort Belvoir, VA; US Army Armament Research and Development Command, Dover, NJ; and the US Army Communications Research and Development Command, Fort Monmouth, NJ. System testing is to be performed by the US Army Test and Evaluation Command, Aberdeen Proving Ground, MD, and the US Army Training and Doctrine Command (TRADOC), Fort Monroe, VA. TRADOC will perform cost and operational effectiveness analyses for the system. The Engineering Development contractor is the Norden Division of United Technologies, Incorporated, Norwalk, CT. The Mortar Fire Control Calculator (MFCC) developer is the US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. System testing will be performed by the US Army Test and Evaluation Command and the US Army Training and Doctrine Command (TRADOC). TRADOC will perform cost-effectiveness analyses for the system. A competitive solicitation for engineering development (ED) is anticipated.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

1. FY 1978 and Prior Accomplishments: (1) To date, for the Position Location and Reporting System (PLRS), the contractor has conducted a trade-off analysis, and issued a Design Plan and a System Technical Description. Contractor tests of the Master Unit software programs began and fifteen Large Scale Integration (LSI) chips were completed. An additional six-month development effort was anticipated to complete the contractor effort. The internal PLRS Development Plan was updated to include a Joint Integrated Logistics Support Plan, and Procurement of Transition Plans. Electronic Warfare and TEMPEST test plans were reviewed. A jammer is being developed for use in Development Test/Operational Test II (DT/OT II). The in-plant government team software monitoring capability was strengthened by transferring a United States Marine Corps (USMC) software engineer to the Hughes plant. (2) Competitive prototype contracts were awarded in July 1976 for the development of Advanced Development models of the Tactical Display System (TDS). Control Data Corporation (CDC) and Litton Data Systems were in competitive development in which the CDC display approach featured a plasma technology and Litton used Light Emitting Diodes (LED) approach. Basic technical problems were encountered in the plasma technology which, if continued, presented high technical risk and cost. The plasma approach will not be pursued any further. The technical feasibility of the LED technology has been established, and this effort will be continued and directed toward producibility, full militarization, and low cost LED modules. (3) The Battery Computer System (BCS) contract for engineering development (ED) was awarded 28 September 1976 based on results of evaluation of responses to a competitive solicitation. Design Reviews were held during 1977 to permit both the user and developer to closely monitor the contractor's progress in hardware and software development. The BCS contractor will complete fabrication of prototypes and the Government will conduct its Preliminary Qualification Test and Operational Test II. (4) For the Mortar Fire Control Calculator (MFCC), Exploratory Development was accomplished and the process to definitize user requirements for the system was initiated during the period 1974-1977. For the MFCC, a Validation In-Process Review (IPR) will be conducted to ensure readiness to enter Engineering Development and development of the procurement package will be initiated.

2. FY 1979 Program: (1) Actions this year will include renegotiation with Hughes to adjust the present contract, continuation of update to the Development Plan and close monitoring of contractor effort. The development of the jammer for use during Development Test/Operational Test II (DT/OT II) will be completed and the acceptance tests conducted. The first user unit prototype will be completed, and the master unit software development and testing will continue. Prototype Qualification Testing-Contractor will begin. (2) For the Tactical Display System (TDS), the US and German Governments are negotiating agreements to continue joint cooperative developments through Engineering Development. One of the Memorandums of Understanding (MOU's) is for the continued development of the Light Emitting Diode (LED) display, and the second MOU calls for the development of a tactical Light Amplication Simulation Emission Radar (LASER) display system which is a foreign technology being built by Electro-Spezial, a division of Philips, Bremen, West Germany. Both agreements are for equal cost sharing of the programs. (3) Planned activities for the BCS include correction of test deficiencies, refurbishment of prototypes, conduct of the Development Validation In-Process Review (IPR), initiation of low rate production, and establishment of the Automatic Test Equipment (ATE) diagnostic capability. (4) All necessary experimental work will have been performed and the MFCC will be ready for full-scale development. All technology and the majority of components required for the MFCC will be readily available from multiple sources. Planned activities for this period include release to industry of the Request for Proposal and award of the Engineering Development (ED) contract.

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: (1) With the planned funding profile of the Position Location and Reporting System (PLRS), US Army Communications Research and Development Command (CORADCOM) and external support efforts will continue and batteries, maintenance, spares will be funded. Training for Operational Test II (OT II) will begin. The contractor will continue prototype fabrication and development of the master unit. Preliminary Qualification Test-Contractor (PQT-C) will conclude and Preliminary Qualification Test-Government (PQT-G) will begin with the delivery of two master units and 64 user units. (2) It is planned, for the Tactical Display System (TDS), to continue competitive efforts at both the subsystem and Light Emitting Diode (LED) module level. At least two contractors will be qualified to produce and logistically support the Tactical Display System. At least two configurations of the Light Amplication Simulation Emission Radar (LASER) display for shelter and expandable van installation will be developed. Subsystem efforts in support of the Tactical Operations System (TOS) to include interactive graphics, communication conferencing, integration, and validation are planned. (3) Planned activities for the Battery Computer System (BCS) include conduct of production acceptance testing and initiation of full production. (4) Planned activities for the Mortar Fire Control Calculator (MFCC) include conduct of Development Test/Operational Test II (DT/OT II) and final preparation to initiate production in FY 1981.

4. FY 1981 Planned Program: (1) The primary effort for PLRS will be DT/OT II which will thoroughly test the Engineering Development System. The Program Management Office will finish required planning leading to the request for proposal for production. Automatic Test Equipment software development and integration will begin; prototype refurbishment will be accomplished. Militarization of a PLRS Portable Test Unit will begin. (2) For the TDS Full-Scale Engineering Development of the LED and LASER Tactical Display System will continue. Testing of prototype subsystems will be initiated. (3) In FY 1981, the Battery Computer System (BCS) will continue the production phase. (4) The FY 1981 program for the MFCC will initiate the production phase.

5. Program to Completion: (1) A Development Acceptance In-Process Review (DEVA-IPR) for PLRS will be held late in FY 1981. Initial Production will begin in the 4th Qtr 1981. Support efforts concentrate on production engineering and product assurance. Automatic Test Equipment support will conclude with a finished program integration. Training in the form of Skill Performance Aids will be developed and follow-on evaluation will be conducted if required. (2) It is planned to complete the full-scale engineering development of the Tactical Display System in FY 1983. (3) Full-scale production and delivery through FY 1983 will complete the BCS and MFCC projects.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DC98
Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Position Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Position Location Reporting System (PLRS) is a joint US Army and US Marine Corps development that will provide combat commanders in the 1980's with automatic, near real time, precise location of their field forces on the battlefield - regardless of terrain, weather or geographical location. The system will augment conventional communications on the battlefield, provide reliable navigation information to friendly forces and enhance the Commander's ability to effectively control his maneuver elements. The Army requires a realtime positioning/navigation command and control capability in a highly mobile environment to enable Commanders to accurately and rapidly navigate, and position weapons systems and maneuver elements to ensure rapid employment of combat power. This will allow for exploitation of technical superiority and act as a force multiplier to assist in defeating an enemy with a numerical advantage and greater fire power.

The system employs a master unit located at or near Division Command Post with an alternate master unit located near Division Artillery for 100% backup to insure system survivability and continuity of operations during rapid command post displacements. The truck or air transportable master unit provides the commander with computer controlled network management and dynamic situation display of 370 lightweight (15-17 lbs) user units in manpack, vehicle and airborne configurations distributed throughout the division's combat maneuver and fire support elements. Each user unit automatically transmits a self-identifying signal burst on a precision time-ordered schedule, measures time-of-arrival of designated user unit transmissions and automatically relays these measurements to the master unit. The master unit computes and continuously updates the position of each user unit. Units equipped with PLRS obtain their location in UTM coordinates, range and bearing to other friendly locations, the UTM coordinate locations of other user units, an alarm indication when entering a predesignated boundary area such as a mine field and the ability to exchange abbreviated digital data messages. Airborne users are provided position location, altitude, corridor guidance around obstacles/danger zones and range and bearing information to locations of ground users or designated coordinate locations for typical combat missions such as medical evacuation, air mobile operations, resupply, extraction and operations requiring voice radio silence. The system is crypto-secure and offers a high degree of resistance to jamming and electronic vulnerability in a hostile electromagnetic environment. The network automatically utilizes surface/airborne user unit integral relays to achieve over-the-horizon transmission and overcome terrain obstruction to line of site communications.

PLRS entered full scale engineering development in 1976. Two master units and 64 user units in various configurations are scheduled for delivery and government testing in FY80. The Development Acceptance In Process Review (IPR) is scheduled for 4th Qtr FY 1981, and the Initial Operational Capability date is 4th Qtr FY 1983.

Project: #DC98
Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Position Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

B. RELATED ACTIVITIES: The US Marine Corps is funding 40% of the PLRS development under Program Element No. 6.47.65.M, Other Marine Corps Development (Engineering). A 60/40 (US Army/US Marine Corps) sharing ratio will be applied to shared costs. The Marine Corps provided funds to assist the Army in making up funding shortfalls during FY 1977, and the Army will provide funds required in subsequent years to achieve the specified ratio relative to total shared cost. The basic requirements and specifications for the PLRS are contained in a 19/6 USA/USMC Joint Service Operational Requirement. PLRS will interface with Command and Control Systems such as the Army's Tactical Operations System (TOS) and the USMC's Marine Integrated Fire and Air Support System (MIFASS) and Tactical Combat Operations System (TCO).

C. WORK PERFORMED BY: Project Manager, Position Location Reporting System/Tactical Information Distribution System (PLRS/TIDS), under Program Manager Army Tactical Data Systems (ARIADS). US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is Hughes Aircraft Company, Fullerton, CA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: To date, the contractor has conducted a tradeoff analysis, and issued a Design Plan and a System Technical Description. Contractor tests of the Master Unit software programs began and fifteen Large Scale Integration (LSI) chips were completed. An additional six-month development effort was anticipated to complete the contractor effort. The internal PLRS Development Plan was updated to include a Joint Integrated Logistics Support Plan, and Procurement and Transition Plans. Electronic Warfare and TEMPEST test plans were reviewed. A jammer is being developed for use in DT/OT II. The in-plant government team software monitoring capability was strengthened by transferring a USMC software engineer to the Hughes plant.

2. FY 1979 Program: Actions this year will include renegotiation with Hughes to adjust the present contract, continuation of update to the Development Plan and close monitoring of contractor effort. The development of the jammer for use during Development Testing/Operational Testing II (DT/OT II) will be completed and the acceptance tests conducted. The first user unit prototype will be completed, and the master unit software development and testing will continue. Prototype Qualification Testing - Contractor will begin.

3. FY 1980 Planned Program: With the planned funding profile, CORADCOM and external support efforts will be renewed and batteries, maintenance, spares will be funded. Training for OT II will begin. The contractor will continue prototype fabrication and development of the master unit. Preliminary Qualification Testing - Contractor (PQT-C) will conclude and PQT - Government (PQT-G) will begin with the delivery of two master units and 64 user units.

Project: #DC98
Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Positioning Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

4. FY 1981 Planned Program: The primary effort will be DT/OT II which will thoroughly test the Engineering Development System. The POM will finish required planning leading to the request for proposal for production. Automatic Test Equipment software development and integration will begin, prototype refurbishment will be accomplished. Militarization of a PLRS Portable Test Unit will begin.

5. Program to Completion: A Development Acceptance In-Process Review (DEVA-IPR) will be held late in FY81. Initial Production will begin the 4th Qtr FY81. Support efforts concentrate on production engineering and product assurance. Automatic Test Equipment support will conclude with a finished EQUATE program integration. Training in the form of Skill Performance Aids will be developed and follow-on evaluation will be conducted if required.

6. Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Development Acceptance (DEVA) In-Process Review	4th Qtr FY 81	Sep 80
Initial Operations Capability (IOC)	4th Qtr FY83	Jun 82

The difference in DEVA IPR dates is attributable to a six-month schedule slip resulting from technical difficulties encountered in developing PLRS, and rescheduling in the first half of FY79. The overall impact on the program of these delays is a change in IOC to 4th Qtr FY83.

Project: #DC98
Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Position Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	6685	7400	8700	10600	10000	46785
Funds (as shown in FY 1979 submission)	6532	1000	3000	--	Continuing	Not Applicable
Quantities (current requirements)						
Quantities (as shown in FY 1979 submission)	Not Applicable					2 Master Units 64 User Units

The FY 78 funds shown in the FY 79 submission reflect a minimum level of funding due to imposed Total Obligation Authority (TOA) limitations. The FY 79 profile of $7400K represents an increase from an internal Army reprograming action and from the FY 79 supplemental budget request. The increase in FY 80 is the result of the shortfall imposed by FY 79 TOA limitations and technical difficulties encountered in the development of software.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.28.A

Title: Family of Military Engineer Construction Equipment (FAMECE)

DoD Mission Area: #442 - Logistics/General Combat Support

Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4673	2275	25	300	0	39250
DH08	Family of Military Engineer Construction Equipment (FAMECE)	4673	1875	25	300	0	30850
D500	Universal Engineer Tractor (UET)	0	400	0	0	0	8400

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army must have earthmoving/construction equipment at or near the forward edge of the battle area to fight and win the next battles. Existing military equipment and comparable commercial equipment will not do the job. This program provides the Army with a family of wheeled and tracked earthmovers (FAMECE and UET) uniquely designed to do the job and provide increased mobility, simplicity of operation, reduced maintenance, and commonality of parts. FAMECE consists of a common power section and eight work sections. The complete vehicles thus have the capabilities of a scraper, dozer, compactor (two types), water distributor, grader, dumper, and front loader. The sectionalized concept permits helicopter lift by a medium lift helicopter and satisfies the requirement for armored/mechanized combat forces in mobility, countermobility, and survivability missions. FAMECE and UET, as wheeled and tracked earthmoving vehicles, complement each other in mission performance and enable the combat engineer units to support the committed forces in a cost and operationally effective manner not possible today. There are no RSI (Rationalization, Standardization, Interoperability) implications.

C. BASIS FOR FY 1980 RDTE REQUEST: Maintain minimum program level to permit planning for and continuity toward completion of FAMECE program.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4672	2275	1000	Continuing	Not Applicable

Program Element: #6.47.28.A

Title: Family of Military Engineer Construction Equipment (FAMECE)

DoD Mission Area: #442 - Logistics/General Combat Support

Budget Activity: #4 - Tactical Programs

The FY 1980 decrease is a result of reduction of $75,000 by Department of Army and $900,000 by the Office of the Secretary of Defense to support higher priority programs.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
FAMECE						
Funds (current requirement)	0	18049	0	19448	0	374970 1/
Funds (as shown in FY 1979 submission)	0	24000	44600	57100	146500	272200
Quantities (current requirement)	0	300	0	292	0	592 1/
Quantities (as shown in FY 1979 submission)	0	376	674	828	2000	3878
Universal Engineer Tractor (UET)						
Funds (current requirement)	0	10600	40500	32600	531000	614900 2/
Funds (as shown in FY 1979 submission)	0	21200	38400	28800	197500	285900
Quantities (current requirement)	0	29	155	120	1662	1966 2/
Quantities (as shown in FY 1979 submission)	0	75	155	120	720	1070

1/ The current FAMECE requirement reflects programs for FY79 and FY81 to meet the Authorized Acquisition Objective (AAO) of 592 units. The estimated FAMECE AAO of 592 units is limited to Airborne and Airmobile units as directed by the Office of the Secretary of Defense. Program as shown in FY79 submission reflects program from FY79 thru FY83 to meet total Army requirements. FY79 current requirement reflects $18.0 million approved by Congress.

2/ The current UET requirement of 1966 units reflects programs from FY79 thru FY86. Program as shown in FY 1979 submission only reflected programs during FY79 thru FY83. FY79 current requirement reflects $10.6 million approved by Congress.

Program Element: #6.47.28.A

Title: Family of Military Engineer Construction Equipment (FAMECE)

DoD Mission Area: #442 - Logistics/General Combat Support

Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: This program consists of the development of the Family of Military Engineer Construction Equipment (FAMECE) and the Universal Engineer Tractor (UET). FAMECE is airmobile and airdroppable and designed to perform construction tasks required of combat engineer units to include dozing, scraping, loading, grading, compacting, excavating, hauling, and spreading. It will utilize a standard wheeled power section which, when combined with comparable wheeled construction sections, will meet combat support construction requirements. The UET is an armored, multipurpose, tracked combat engineer earthmover capable of performing pioneer tasks such as dozing, scraping, rough grading, and off-road prime moving in support of combat operations.

G. RELATED ACTIVITIES: There is no effort by other Services to develop like equipment. The Army maintains coordination with the United States Marine Corps, Air Force, and Navy concerning this project.

H. WORK PERFORMED BY: In-house work is performed by elements of the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors are Clark Equipment Company, Benton Harbor, MI, for FAMECE; and Pacific Car and Foundry, Renton, WA, for UET.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Operational Testing II (OT II) was conducted on FAMECE. The UET was type classified standard.

2. FY 1979 Program: The Development Test II/Operational Test II (DT II/OT II) report on FAMECE will be submitted. The developmental acceptance in-process review (DEVA IPR) for FAMECE is scheduled for March 1979. At that time the cost and operational effectiveness analysis (COEA) will be submitted by the US Army Training and Doctrine Command (TRADOC). Producibility Engineering Planning (PEP), Initial Provisioning Documentation, and Skills Performance Aids development will be conducted after type classification.

3. FY 1980 Planned Program: FAMECE program will continue at minimum sustaining level to permit planning for and provide continuity toward completion of program.

4. FY 1981 Planned Program: Reinstate development of required backhoe section of FAMECE deferred in FY 1980.

5. Program to Completion: Work will be continued to complete FAMECE backhoe section.

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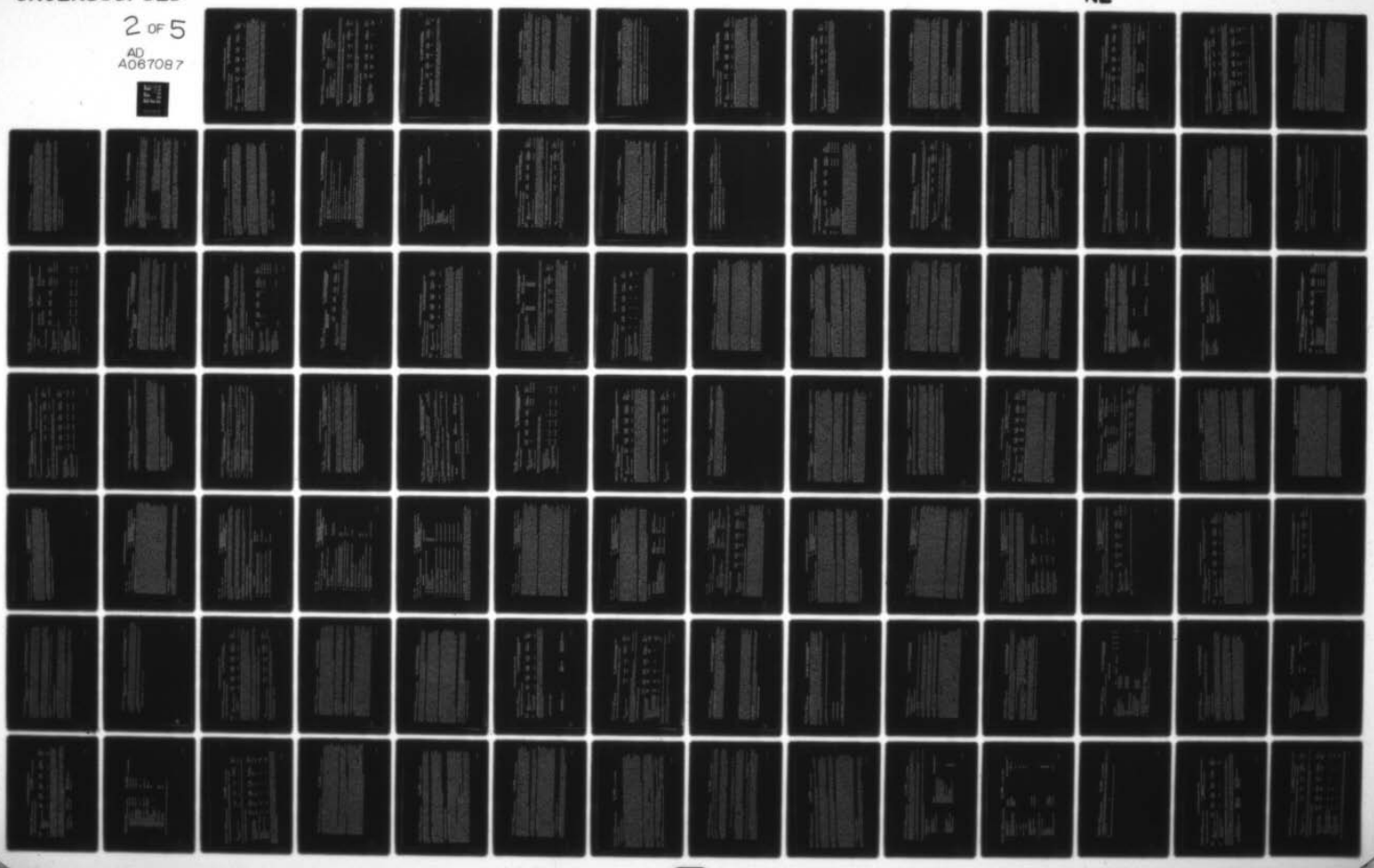

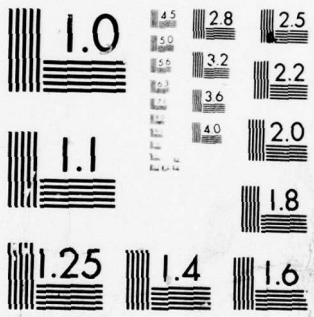

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FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5226	4381	1600	0	0	43770
	QUANTITIES						5
DL81	Countermortar Radar	5226	4381	1600	0	0	43770

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The countermortar radar, AN/TPQ-36, will automatically detect and locate hostile mortars, artillery, and rockets at short and mid-ranges over a wide sector with sufficient accuracy and timeliness to permit effective counterfire. It is being developed for the US Army and Marine Corps to replace the obsolescent, manually operated AN/MPQ-4 radar in order to provide an effective and responsive capability to front line units against the heavy mortar/artillery threat. Experience in Vietnam with the AN/MPQ-4 radar clearly indicated its shortcomings and the need for improvements represented by the AN/TPQ-36 countermortar radar. Threat estimates indicate that, in future conflicts, US forces will be significantly outmanned and outgunned. Soviet/Warsaw Pact forces place great emphasis upon the use of indirect fire weapons. The accurate and timely location of these numerically superior weapons is vital to ground warfare. The AN/TPQ-36 will automatically interface with the Tactical Fire Direction System (TACFIRE) to further reduce response times and increase effectiveness.

C. BASIS FOR FY 1980 RDTE REQUEST: To provide for completion of special tools and test equipment design for field and depot use, extension of contractor engineering services (field test crews, depot support of engineering development models and Reliability, Availability, and Maintainability (RAM) analysis), software upgrading, survivability enhancement, and completion of institutional training device development.

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Army Systems Acquisition Review Council (ASARC III)	December 1977	November 1977
Follow-on Evaluation (FOE)	June 1979	Not shown
Initial Operational Capability (IOC)		

Development Test (DT) III is not being conducted because DT II successfully demonstrated the system was ready for production. Slippage in IOC is due to longer than anticipated contract negotiations and subsequent award of Full-Scale Production contract.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4226	4381	2050	1050	44314

FY 1978 increase covered development work on the institutional training device, and producibility engineering and planning. FY 1980 decreased by $450K due to completion of the producibility engineering and planning effort. Additional funds to completion were deleted. Program will complete the RDTE effort in 1980.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	54800	51500	83400	10/200	0	296900
Funds (as shown in FY 1979 submission)	53300	49900	74500	0	0	177700

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Quantities (current requirement)	10	24	50	61	0	145
Quantities (as shown in FY 1979 submission)	20	31	48	0	0	99

A three-year multiyear (FY 1978-1980) contract was awarded in August 1978. Changes reflect the most economical procurement rate to maintain continuous production of the AN/TPQ-36. The US Marine Corps will also procure the AN/TPQ-36 in FY 1979 and 1980. Quantity estimates also reflect an increase in the Authorized Acquisition Objective.

Program Element: #6.47.29.A Title: Countermortar Radar (AN/TPQ-36)
DoD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The countermortar radar, designated the AN/TPQ-36, is designed to automatically locate hostile mortar launch sites to a range of ; with an accuracy of and a probability of location of Artillery and rockets can also be located to this range with a small reduction in accuracy and probability of location. The AN/TPQ-36 radar will replace the AN/MPQ-4 radar which has been the Army mortar locating radar since 1958. The AN/MPQ-4 is limited in sector coverage, requires manual operation, and has reliability and maintainability problems. The AN/TPQ-36 incorporates the latest advance in planar array antennas and computer technology, and provides a highly mobile system with automatic first round locations over a wide selectable sector.

G. RELATED ACTIVITIES: Development of the countermortar radar, AN/TPQ-36, was previously funded in Program Element/Project 6.47.23.A/DL72 radars. Transfer to Program Element/Project 6.47.29.A/DL81 (Countermortar Radar) was made in FY 1973 to separate funds of the Countermortar Radar from other radars found in the previous program element. The Counterbattery Radar AN/TPQ-37, is being developed under 6.47.31.A/DL83.

H. WORK PERFORMED BY: The in-house developing organization for the program is the Project Manager, FIREFINDER (Counterbattery and Countermortar Radars), US Army Electronics Research and Development Command, Fort Monmouth, NJ. A contract for five engineering development models was awarded to Hughes Aircraft Company, Fullerton, CA, in October 1973. A three-year multiyear contract with two one-year options to produce the quantities shown in paragraph E was awarded to Hughes Aircraft Company, Fullerton, CA, in August 1978. Institutional training devices for the US Army Field Artillery School are being developed for Project Manager, FIREFINDER by Project Manager Training Devices, Orlando, FL. A contract for training devices was awarded to Hughes Aircraft Company in August 1977.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Engineering Development of the countermortar radar was initiated in FY 1972. Several administrative milestones were accomplished leading to expected award of a contract for Engineering Development of the radar in late FY 1972. This award was delayed until October 1973 due to protests of the procurement selection proceedings by International Telephone and Telegraph (ITT)-Gilfillian, RCA, and General Electric. Extensive litigation concerning the protests was conducted and no work on the radars could be undertaken in FY 1973. The General Accounting Office resolved the protests in favor of the Army in October 1973. A contract for five Engineering Development (ED) models was then awarded to Hughes Aircraft Company, Fullerton, CA. Extensive design-to-cost engineering efforts were conducted in FY 1974/75 to achieve the most cost-effective radar design. In FY 1974, fabrication of the five models was initiated. The first model was delivered to Yuma Proving Ground in July 1975 where it completed Prototype Qualification Testing. During FY 1976 fabrication of the remaining four models was completed using experience gained from the first model. To date, four models have been live fire tested at Yuma Proving Ground

with all critical test requirements successfully completed. The Army completed a comparative evaluation with the United States Marine Corps Hostile Weapons Locating Radar (HOWLS) and the AN/TPQ-36 countermortar radar in July 1976. The Marine Corps has terminated the HOWLS development and is procuring 22 AN/TPQ-36 radars. Development Test (DT) II was completed in March 1977 and Operational Test (OT) II was completed at Fort Carson, CO, in June 1977. Commonality planning with the AN/TPQ-37 radar was initiated in FY 1977. Life cycle cost savings are expected to approach $50 million as a result of the common operations shelter being used by both systems. Full scale production of the AN/TPQ-36 began in August 1978. Two Engineering Development (ED) systems with trained crews were shipped to Europe in September 1978 for early deployment.

2. FY 1979 Program: Continue full scale production. RDTE funds will be used to complete special tools and test equipment design; continue training device development; maintain upgrade of system software documentation and engineering support.

3. FY 1980 Planned Program: Continue full scale production (OPA). Complete software upgrading, engineering services, survivability enhancement, and training device development.

4. FY 1981 Planned Program: Not Applicable. RDTE efforts for the AN/TPQ-36 will be completed in FY 1980.

5. Program to Completion: Not Applicable. RDTE efforts for the AN/TPQ-36 will be completed in FY 1980.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.30.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Remotely Piloted Vehicles (RPVs)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	18203	49400	29940	Continuing	Not Applicable
	QUANTITIES						4
D040	Remotely Piloted Vehicle	0	18203	49400	29940	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for Full Scale Engineering Development (FSED) of a Remotely Piloted Vehicle (RPV) System to fill the requirement for unmanned aerial target acquisition, target designation and location. Laser designation for laser seeking weapons such as cannon launched guided projectiles (COPPERHEAD) and helicopter launched missiles (HELLFIRE) will be accomplished as well as artillery adjustment and battlefield reconnaissance. This system will extend the eyes of Brigade and Division elements to the range of their direct support artillery weapons where, during combat, ground based systems cannot see and manned observation aircraft cannot operate with acceptable attrition rates. This system will multiply the effectiveness of field artillery and assist the commander to optimally employ his forces by providing artillery adjustment and laser designation on targets at the full range of the field artillery. The user has established a high priority on fielding this system. The proposed RPV system was approved to enter FSED by the Department of the Army in September 1978. The major activity to date has been the AQUILA Systems Technology Demonstration Program.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds requested provide for the second year of a 40 month FSED program for a daylight, clear weather, target acquisition, designation and reconnaissance RPV System. Separate contracts will be awarded for the RPV System and the associated anti-jam data link. The data link is a joint development effort that will provide common data link modules for the Stand-Off Target Acquisition System (SOTAS), Air Force guided bombs, and the RPV. In-house support will include monitoring contractor performance using design reviews and controlling cost, technical work, and schedule. Off-the-shelf commercial components or commercial standards will be used in lieu of military specifications wherever possible.

Program Element: #6.47.30.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Remotely Piloted Vehicles (RPVs)
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	0	22003	32455	Continuing	Not Applicable

FY 1979 funds were reprogramed to make critical repairs at White Sands Missile Range which were made necessary by a flash flood. A US Army RPV task force was formed to prepare for Full Scale Engineering Development. The FY 1980 estimate has been increased based upon the detailed estimate of the task force, which in addition to higher sensor and data link estimates, includes training and integrated logistics support costs. The total estimate to completion is not complete because the program for the night/adverse weather sensor, which will be added to the basic system, has not been finalized.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.30.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Remotely Piloted Vehicles (RPVs)
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: This program will accomplish the Full Scale Engineering Development (FSED) of the RPV Systems for employment by the Army. This is a new program element beginning in FY 1979. The approval to enter FSED was given by Department of the Army (DA) in September 1978. The system parameters have been defined based upon the results of the AQUILA RPV System Technology Demonstrator testing which was completed under Program Element (PE) 6.37.25.A, Remotely Piloted Vehicles/ Drones, in FY78. Requests for Proposals (RFPs) for the data link were issued to industry in FY 1978 with an expected contract award in mid FY79. RFPs for the RPV system contractor will be issued to industry in FY 1979. Contractors will be selected to design and fabricate 25 air vehicles, 4 ground control stations, 4 launch and recovery systems and 18 daylight sensor systems starting in FY 1979. Production decision is planned for FY 1983. The 1st generation RPV effort will provide a target acquisition, artillery adjustment, laser designation and reconnaissance capability. It will be a clear weather, day system with an anti-jam data link. Modular payloads and command and control improvements currently in development under PE 6.37.25.A will add a night and adverse weather capability approximately two to four years after the clear weather system becomes operational.

G. RELATED ACTIVITIES: The RPV was funded during Exploratory Development and Advanced Development in FY 1975 - 1978 under PE 6.27.32.A, Remotely Piloted Vehicle Supporting Technology and 6.37.25, Remotely Piloted Vehicles. Development of different interchangeable payloads such as night and adverse weather sensors and jammers will continue under these two PEs. The Air Force RPV programs consisting of PE 6.37.39.F, Advanced RPVs, and PE 6.47.46.F, Expandable Drones, are being monitored to utilize applicable technology, as appropriate. The Marine Corps is developing a similar requirement and is expected to participate in production buys of RPVs. The Army and Air Force RPV program managers meet quarterly to preclude duplication of effort between the services..

H. WORK PERFORMED BY: US Army Aviation Research and Development Command, St. Louis, MO; Combat Surveillance Target Acquisition Laboratory, US Army Electronics Research and Development Command, Fort Monmouth, NJ; Night Vision and Electro Optics Laboratory, US Army Electronic Research and Development Command, Fort Belvoir, VA; Research and Technology Laboratories, Aero Mechanics Lab, Moffett Field, CA; Applied Technology Lab, Fort Eustis, VA; and the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors will be selected in FY 1979.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Not Applicable.

2. FY 1979 Program: This is a new engineering development program starting in FY 1979, following a successful Systems Technology Demonstrator program accomplished under PE 6.37.25.A from FY 1975 through 1978. All experimental work required before moving into engineering development (ED) has been completed in the AQUILA RPV program and parallel technology efforts. An anti-jam data link was flight tested in FY 1978 in both a manned aircraft and the RPV. By the beginning of FY 1979

all necessary pre-engineering development work was completed for a daylight, clear weather, target acquisition, laser designation and reconnaissance system. The proposed system was approved for entry into Full Scale Engineering Development (FSED) in FY78 with a Request for Proposal (RFP) release to industry planned in FY 1979. Source Selection and Contract Award will be accomplished by the 4th quarter FY 1979. The contractor is expected to begin design and engineering late in FY 1979. The Engineering Development (ED) contract is expected to last 40 months. In-house support will consist of monitoring the contractor's work using design reviews to control the costs and technical progress of the program.

3. FY 1980 Planned Program: Continue the FSED program initiated in FY 1979. Design and assembly of the equipment will be completed during this period. Following completion of reviews, component test, fabrication and assembly will be initiated. Long lead items for FSED will be ordered to meet RPV schedules. In-house support will continue to monitor contractors efforts controlling the cost, technical and schedule efforts.

4. FY 1981 Planned Program: Continue the FSED program initiated in FY79. The 1st flight of the system in mid FY81 will mark the beginning of developer and user resting which will continue through FY82.

5. *Program to Completion*: The FSED program will continue through FY 1983. Production decision is expected in early FY83. Improved sensors and command control techniques developed under PE 6.37.25.A, Remotely Piloted Vehicles (PRVs)/Drones, will be integrated into the RPV System as they mature through the technology base. These programs currently include Forward Looking Infrared (FLIR) and millimeter radar sensors as well as multi-control and extended range command and control improvements. These growth capabilities will provide a day/night/adverse weather capability in the mature RPV system.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	11589	6849	2647	0	0	74185
	Quantities						2
DL83	Counterbattery Radar	11589	6849	2647	0	0	74185

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Threat estimates indicate that, in future conflicts, US forces will be significantly outmanned and outgunned. Soviet/Warsaw Pact forces place great emphasis upon the use of indirect fire weapons. The accurate and timely location of numerically superior long-range artillery and rockets is vital to ground warfare, and experience in Vietnam vividly documented the inability of US forces to locate these indirect fire weapons. The AN/TPQ-37 has been expedited to fill the critical void in our capabilities to locate long-range artillery and rockets at normal deployment ranges. Through an automatic interface with the Tactical Fire Direction System (TACFIRE), response times will be greatly reduced, and field artillery counterfire effectiveness significantly enhanced.

C. BASIS FOR FY 1980 RDTE REQUEST: The funding in FY 1980 will complete development of the training devices, complete the survivability enhancement program, and provide development testing and technical support.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Initial limited procurement system transported to Fort Sill, OK	January 1979	October 1978
Initial live fire acceptance testing	March 1979	December 1978
Initial fielding		

The above milestones have been adjusted to allow the contractor further assembly and in-plant testing prior to delivery of the first system to the field.

Program Element: #6.47.31.A Title: Counterbattery Radar (AN/TPQ-37)
DoD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	11339	6849	2483	0	73770

Additional funds in FY 1978 were used to complete development of the Common S250 Shelter Operations Control Group, the design of a General Support maintenance capability, upgrading of the Radar Environmental Simulator for Depot Support activities, and continuation of development and design of survivability enhancement features. Additional funds in FY 1980 are to be used for development and design of a Maintenance Training Device and for completion and testing of survivability enhancement features.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	22500	40200	32600	91000	82200	320300
Funds (as shown in FY 1979 submission)	22500	40200	63000	-	72100*	249600*
Quantities (current requirements)	5	11	6	24	24	80
Quantities (as shown in FY 1979 submission)	5	11	15	-	17*	58*

* Additional 28 systems to be funded beyond FY 1983 (shown in FY 1979 submission).

Change from total of 86 systems in FY 1979 submission reflects new procurement objective of 80 systems in FY 1980 submission. Procurement to be completed in FY 1982. Rising costs and more economical procurement benefits strategy were taken into consideration for change of quantity and schedule.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The counterbattery radar, designated the AN/TPQ-37, will automatically locate hostile artillery and long-range rocket launch sites out to ranges of for tube artillery and for large rockets. The US Army has no effective means to locate hostile artillery with sufficient accuracy and speed. The AN/TPQ-37 incorporates the latest advances in phased array antenna and computer technology and will provide first round detection and location of weapons over a degree sector coverage. Detailed system characteristics are depicted in the Test and Evaluation Data Section of this descriptive summary.

G. RELATED ACTIVITIES: Development of the counterbattery radar, AN/TPQ-37, was previously funded in Program Element/Project 6.37.19.A, DK72, Radars. Transfer to Program Element/Project 6.37.29.A, DK93, Counterbattery Radar, was made in FY 1973 to separate funding of the counterbattery radar from other radars found in the previous program element. Transfer to Program Element/Project 6.47.31.A, DL83, Counterbattery Radar, was made in FY 1977. The countermortar radar, AN/TPQ-36, is funded under Program Element/Project 6.47.29.A, DL81, Countermortar Radar.

H. WORK PERFORMED BY: The in-house developing organization for this program is the Project Manager, FIREFINDER (Counterbattery and Countermortar Radars), US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractual work is being performed by Hughes Aircraft Company, Fullerton, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Studies and computer simulations of the proposed counterbattery radar system to determine the technical feasibility of developing such a radar were conducted prior to FY 1972. The desired capabilities of the proposed radar were evaluated against the state-of-the-art, resulting in a firm conclusion that the radar could be designed and built. The advanced development program included a two contractor, competitive phase to shorten the total development cycle and reduce the technical risk. Contracts were awarded to Hughes Aircraft Company and Sperry Rand Corporation in June 1972, for each to build a model of the radar systems. Both contractors completed engineering design planning in mid-FY 1973, and fabrication of components was started. Fabrication of both systems was completed in FY 1975. The radars were subjected to live fire acceptance testing at Fort Sill, OK, followed by competitive development testing. Weapons were automatically located at ranges to 34 kilometers. The radar demonstrated the capability to transmit information digitally to the Tactical Fire Direction System, marking the first time two operational systems had transferred such digital information. Competitive developmental and operational testing were concluded in FY 1976, followed by an environmental evaluation. Source selection was concluded in May 1976, with Hughes Aircraft Company being chosen as the prime contractor. As a result of a May 1976 decision briefing to the Principal Deputy Director of Defense Research and Engineering, guidance was given to emphasize commonality of components between the countermortar radar, AN/TPQ-36, and the counterbattery radar, AN/TPQ-37, particularly the shelterized components. On 27 October 1976, an Army Systems Acquisition Review Council (ASARC) rendered a decision to proceed into production. Concurrent with the

start of production there was continuing developmental effort to effect a common shelter design including a changeover to 400 Hz power, Producibility Engineering and Planning (PEP), initiation of training device development and other engineering changes to improve Reliability, Availability, and Maintainability (RAM). The 1978 program continued system hardware development, survivability enhancement, producibility engineering and planning to facilitate transition into full-scale production, and training devices development required before the system is fielded. Development of Special Test Equipment for the General Support capability in the field was initiated. Initial testing, planning, and support efforts for the systems procured for delivery in FY 1979 was initiated. Preparations for Government configuration control were initiated.

2. FY 1979 Program: Conduct production acceptance testing on first ten limited procurement systems. Start development testing. Continue training device, built-in test equipment, and survivability enhancement developments. Conclude producibility planning and documentation, and configuration control efforts. The FY 1979 effort is essential to properly support fielding of the hardware systems. Decrease in funding in last submission was due to completion of hardware system development during FY 1978, and subsequent reduction of RDTE efforts.

3. FY 1980 Planned Program: Development efforts will be terminated with the completion of FY 1980. Final support will be required to successfully complete the final development testing phase conducted on the initial ten limited procurement systems. All survivability enhancements and training device development efforts will be completed.

4. FY 1981 Planned Program: Not Applicable.

5. Program to Completion: Not Applicable.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

J. TEST AND EVALUATION DATA:

1. Development Test and Evaluation:

a. Development Contractor: Hughes Aircraft Company Ground Systems Division, Fullerton, CA

b. Summary Description: Development Test (DT) I - During DT I the system was operated by typical Army crews. More than 1400 rounds in both single and multiple weapon problems were fired during the test. Test shots were designed to stress radar performance at minimum and maximum ranges, at the search sector edges, and with high crossing and elevation rates. The radar was located at five different sites requiring crews to frequently emplace and displace the systems. Performance characteristics demonstrated during DT I are listed below. US Army Test and Evaluation Command is responsible for conduct of the developmental testing of this system.

c. Schedule:

DT I	16 Jun 75 - 19 Sep 75
DT II	Waived due to Low Rate Initial production decision in October 1976. System met all principal performance requirements.
DT III	Jan 79 - Jun 80. Adjusted from FY 1979 submission to allow contractor further assembly and in-plant testing, and to conclude all DT testing before full scale production decision.

d. Similarity of Equipment: The central data function of the tested AN/TPQ-37 was configured in an S280 shelter mounted on a 2 1/2 ton truck. To take advantage of commonality in design with the AN/TPQ-36 system, this function in the production version was reconfigured into an S250 shelter. The new shelter will be identical for both FIREFINDER systems. This change required that some hardware be moved to the antenna trailer assembly. There are several other design changes made to facilitate the production process. One example is the redesign of the antenna sub-array modules. These changes will improve the performance demonstrated to date in either Development Test (DT) or Operational Test (OT). An automatic height correction capability will be incorporated in the production equipment.

e. Items not tested: Built-in-Test-Equipment (BITE). Because the BITE was not finished, it was difficult to determine the system's operability under all conditions. Common shelter. To maximize commonality with the AN/TPQ-36, a common shelter was substituted into the system. These changes will enhance the logistical supportability of the system. These items will be tested during Development Test/Operational Test (DT/OT) III.

f. Deficiencies: Safety hazards were found associated with the rotation and elevation of the antenna. These hazards have been corrected.

g. Reliability, Availability, and Maintainability (RAM): The radar demonstrated an instantaneous Mean Time Between Failures (MTBF) of 28 hours at the completion of Development Test (DT) I. A three week reliability improvement phase was conducted between DT I and Operational Test (OT) I. The initial procurement program also contains an extensive reliability growth and improvement program. All maintenance was performed by contractor personnel. Built-in-Test-Equipment (BITE) software was not complete so accurate maintainability evaluation could not be made. A maintenance assessment was conducted during August 1976. This assessment demonstrated a Mean Time to Repair (MTTR) of about 10 minutes against a requirement of 30 minutes at organizational level.

2. Operational Test and Evaluation:

a. Operational test and evaluation (OT) accomplished to date: OT I was conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Fort Sill, Oklahoma, during an eight-week period in the 2d Quarter FY 1976. This was a combined test in which OT type data was collected and evaluated in conjunction with DT data taken in the 4th Quarter, FY 1975 and the 1st Quarter, FY 1976. The test included typical military crews performing enemy artillery detection and friendly registration missions using two competing prototype radars. Electronic countermeasures, vulnerability, and reliability were also evaluated to a limited extent. Four different threat matrices were used, the largest of which employed 24 firing positions firing simulated preparatory fires. During the entire OT I, 8,500 rounds were fired and the system was required to move 30 times. The final subtest involved a 72 hour field training exercise.

b. Operational Test and Evaluation to be accomplished prior to major production contract award: A low rate initial production decision (LRIP) was made in October 1976, thereby, eliminating the requirement for OT II. OT III is scheduled to be conducted by OTEA at Ft. Hood, TX, during the period 19 Feb 80 - 8 Apr 80. Operational interface with TACFIRE will be included in this test. The radar will observe artillery and mortar threat fires. Data gathered during the test will not be solely compared to that collected in previous testing, since the issues and criteria have been refined to meet the needs of the user.

c. Schedule:

Operational Test (OT) I	13 Oct 75 - 14 Dec 75
OT III	19 Feb 80 - 8 Apr 80

d. Statement of results: The results were achieved against a mixture of calibers and ranges represented by the threat.

Mean Probability of Location =
Mean Accuracy of Location =
Radar Located batteries under jamming conditions, Probability of Location =

e. Similarity between tested and production items: Same as le above.

f. Subsystems not tested: Same as 1f above.

g. Agency responsible for OT: US Army Operational Test and Evaluation Agency (OTEA).

h. Location of Tests:

Operational Test (OT) I - Fort Sill, Oklahoma
OT III - Fort Hood, Texas

i. Operators - Military Crews (OT I and III)
Maintenance Personnel - Contractors (OT I); Military (OT III)

j. Major deficiencies and remedial action: There were no major deficiencies found during OT I.

k. Reliability, availability, and maintainability (RAM): Using a hardware oriented methodology, the radar demonstrated a Mean Time Between Failures (MTBF) of 63 hours at the completion of OT 1, versus a requirement of 90 hours. Using methodology designed to capture operational considerations, the mean time between failures was 11.5 hours. This methodology includes failures of government furnished equipment (e.g., generators) and those failures caused by crew errors and does not address partial mission failures. The initial procurement program contains an extensive reliability growth and improvement program. Predictions of production system reliability indicate the required MTBF will be met.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance
Single Weapon		
Probability of 1st Round Location		
Range		
105mm Howitzer		
155mm Howitzer		
175mm Howitzer		
4.5 inch Rocket		
Honest John Rocket		
Accuracy		
Artillery		
Registration		
Simultaneous Firings		

* Limited by range safety constraints.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.40.A
DoD Mission Area: #424 - Tactical Reconnaissance

Title: Tactical Surveillance System
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	QUANTITIES						
D662	Tactical Surveillance System					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program (Part A) engineering development (ED) work which is directed toward developing a tactical support system to collect, process, and disseminate intelligence/information which locates enemy units, activity and targets representing a general tactical threat. To make such essential intelligence/information rapidly available to the tactical commander the TENCAP program applies advanced techniques to exploit information collected from a variety of surveillance sensors; information which, in general, is not otherwise obtainable.

C. BASIS FOR FY 1980 RDTE REQUEST: Continue engineering development work on hardware/software interfaces between existing sensor systems and Army tactical exploitation systems.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	0			Continuing	Not Applicable

The FY 1979 authorization by Congress was $6.3M less than that requested. This caused the prototype development program to terminate, thereby reducing the requirement for funds in FY 1980. This budget request provides minimum resources to provide support to the BETA demonstration utilizing assets developed under PE 63730A/D560.

Program Element: #6.47.40.A
DoD Mission Area: #424 - Tactical Reconnaissance

Title: Tactical Surveillance System
Budget Activity: #4 - Tactical Programs

E. OTHER APPROPRIATIONS: Not Applicable.

F. DETAILED BACKGROUND AND DESCRIPTION: This program supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program engineering development (ED) work which is directed toward developing a tactical support system to collect, process, and disseminate intelligence information which locates enemy units, activity, and targets representing a general tactical threat. Such intelligence information is essential to the tactical commander to enable him to fight and win while outnumbered in a highly intensive but short duration conflict. The tactical commander must have the capability to locate, identify, engage and attrite numerically superior enemy forces at maximum range to insure that a manageable combat power ratio exists in the main battle area. The tactical commander must also have the capability to seize the initiative from the enemy by blunting his strength and exploiting his weaknesses. Since the enemy has the advantages of great numerical superiority and the choice of time, location, and nature of an attack, friendly forces must rely heavily on superior intelligence systems to counter these advantages. In the TENCAP program, advanced techniques are applied to exploit information collected from a variety of surveillance sensors, which, in general, is not otherwise obtainable. The objective is to provide that information to the tactical command and control environment in a sufficiently timely and useful form to greatly assist the commander in defeating the enemy.

G. RELATED ACTIVITIES: Technological developments designed to shorten the time required to collect and disseminate information are related to this development. These areas include automated search procedures, data link technologies, and tactical identification and positioning. The use of satellite communications is being considered. The initial efforts to provide the technical basis for the equipment and techniques were addressed under Program Element (PE) 6.37.30.A, D560, Tactical Surveillance Systems. This work is closely monitored by appropriate offices at the to preclude duplication of effort.

H. WORK PERFORMED BY: RCA Corp., Camden, NJ; TRW, Los Angeles, CA; Aerospace Corp., El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; Ford Aerospace Systems Corp., Palo Alto, CA; US Army Communication Development and Readiness Command (CORADCOM), Fort Monmouth, NJ.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Not Applicable.

2. FY 1979 Program: As a result of the lack of sufficient funding for FY79, ED of the hardware required to interface with a major collection system has been deferred. The available funds will be used for exercise support, overhead and related training activities.

Program Element: #6.47.40.A
DoD Mission Area: #424 - Tactical Reconnaissance

Title: Tactical Surveillance System
Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: Engineering development (ED) of software, interface equipment, communications links and training necessary to provide input to the BETA demonstration. All necessary experimental work will have been performed.

4. FY 1981 Planned Program: Begin ED of an advanced data exploitation system. All necessary experimental work will be performed and the proposed system will be ready for prototype development.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	QUANTITIES						Not Applicable
D906	Tactical Electronic Support Measures Systems					Continuing	Not Applicable
D909	Tactical Electronic Surveillance Systems					Continuing	Not Applicable
D926	Tactical Electronic Warfare and Intelligence Command and Control Systems					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to provide for full scale development/engineering development of tactical electronic support measures (ESM) equipment and systems, electronic warfare and intelligence command and control systems, and tactical electronic surveillance systems for use by division, corps, and echelon above corps commanders. Army commanders, at all echelons, depend upon tactical intelligence, combat information and effective electronic counter-measures to win the land battle. The enemy may be expected to have weapons generally as effective as our own, and it may be anticipated that he will have them in greater numbers, at least in the early stages of conflict. Detection, positive identification and location of the enemy's main thrust must be made early, while leading elements are still in the covering force area, so that the force can be met with massed armor and anti-tank weapons. The equipment and systems in this program provide the Army with this capability. Specifically, ESM systems for different tactical echelons and different information needs and tactical electronic surveillance systems are developed and tested prior to initiation of production.

Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

C. BASIS FOR FY 1980 RDTE REQUEST: Continue development of the

Continue the full scale development of tactical electronic surveillance systems, AN/TSQ-109 Automatic Ground-Transportable Emitter Location and Identification System (AGTELIS), AN/MLR-8 Technical Electronic Support Measures (TECH ESM) System, and the Communications High-Accuracy Airborne Location System (COMM HAALS).

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)				Continuing	Not Applicable

in FY 1978 was internal reprograming to meet higher priority unfunded requirements.

in project D906 to fund AGTELIS, TECH ESM, and COMM HAALS in program VI, vice program III in FY 1980.

E. OTHER APPROPRIATION FUNDS: ($ in thousands) The Army's FY 1979 supplemental budget request for Other Procurement, Army contains a request for Tactical Control and Analysis Centers. The Army also plans to request systems in the FY 1981 Other Procurement, Army budget request. These two programs were not previously reflected.

Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: This program includes the development of equipment and systems to detect, locate, and identify enemy communications and non-communications emitters, provide for control and analysis of Army Division and Corps tactical electronic countermeasures (ECM) systems, electronic support measures (ESM) systems, and other intelligence sensor systems and electronic and other order of battlefield information. Equipment development includes ground-vehicular and airborne-mounted systems. All items in this program are Intelligence-Related Activities (IRA); Non-IRA items were transferred to the new Program Element 6.47.50.A Tactical ECM Systems and SIGINT items were transferred to National Security Agency (PE 3.10.11.G) in FY 1979, however, AN/TSQ-109, AN/MLR-8, and COMM HAALS, while approved and supported by NSA, were not funded in the National Foreign Intelligence Program in FY 1980 due to budgetary constraints.

G. RELATED ACTIVITIES: Related developments are conducted by the Air Force, Navy and the National Security Agency (NSA). Coordination is effected between the Services and NSA to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary for Defense Research and Engineering through the exchange of technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services and NSA. Following Program Elements apply: 2.56.74.N Electronics Countermeasures Response, 6.42.55.N Electronic Support Measures Equipment, 6.37.97.N Surface Electro-Optic System, 6.47.10.F Reconnaissance Electronic Warfare Equipment, 6.37.43.F Electro-Optic Warfare, and 3.10.11.G, Cryptologic Activities.

H. WORK PERFORMED BY: Major contractors are: TRW, Incorporated, Redondo Beach, CA; BDM Incorporated, McLean, VA; Bunker-Ramo Corp, Westlake Village, CA. In-house development and contract monitoring is conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; and the US Army Signals Warfare Laboratory, Vint Hill Farms, Warrenton, VA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments:
were deployed. completed development and was fielded. Development of the system was completed. Development Test (DT) II conducted and a limited procurement contract awarded. Engineering Development of was completed, Development Test (DT) II and Operational Test (OT) II were completed, the system type was classified and a limited procurement contract was awarded. Development of the receivers and was initiated.

Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

Specifications were prepared for fabrication of the division level Tactical Control and Analysis Centers on a Quick Reaction Capability (QRC) basis.

2. FY 1979 Planned Program: Ongoing efforts will continue. A contract for procurement of the Tactical Control and Analysis Center will be awarded and Government furnished equipment will be delivered to the prime contractor.
will continue with the preparation for and conduct of software system demonstration and a determination made as to the modifications required on sensor subsystems to conduct the required interfaces. Development of Tactical Electronic Surveillance Systems will continue.

3. FY 1980 Planned Program:

4. FY 1981 Planned Program:

5. Program to Completion: This is a continuing program. Developments under this project will normally have been transferred from advanced development, Program Element 6.37.45.A, Tactical Electronic Warfare Equipment.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D906 — Title: Division Tactical Electronic Support Measures Systems
Program Element: #6.47.45.A — Title: Tactical Electronic Warfare Systems
DoD Mission Area: #445 - Electronic Warfare/Counter C^3 — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to conduct engineering development, testing and type classification action for tactical electronic support measures (ESM) equipment and systems to assist the Brigade and Division commnder in intercepting, locating and identifying hostile command and control communications and radars associated with weapons systems, maneuver forces and other threats of immediate value to the commander. Army commanders, at all echelons, depend upon tactical intelligence, combat information and effective electronic countermeasures to win the land battle. The enemy may be expected to have weapons generally as effective as our own, and it may be anticipated that he will have them in greater numbers, at least in the early stages of conflict. Detection, positive identification and location of the enemy's main thrust must be made early, while leading elements are still in the covering force area, so that the force can be met with massed armor and antitank weapons. The equipment and systems in this program provide the Army with this capability. Specifically, ESM systems for different tactical echelons and different information needs and tactical electronic surveillance systems are developed and tested prior to initiation of production.

B. RELATED ACTIVITIES: Related developments are conducted by the Air Force, Navy and the National Security Agency (NSA). Coordination is effected between the Services and NSA to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary for Defense Research and Engineering through the exchange of technical reports, attendance at scientific meetings and conferences, and joint participation on sub-groups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In additon, each Service's formal requirements documents are reviewed and commented upon by the other Services and NSA. Following Program Elements apply: 2.56.74.N Electronics Countermeasures Response, 6.42.55.N Electronic Support Measures Equipment, 6.37.97.N Surface Electro-Optic System, 6.47.10.F Reconnaissance Electronic Warfare Equipment, 6.37.43.F Electro-Optic Warfare, and 3.10.11.G, Cryptologic Activities.

C. WORK PERFORMED BY: Major contractors are: Bunker-Ramo Corporation, Westlake Village, CA, ESL Incorporated, Sunnyvale, CA, and International Business Machines Corporation, Owego, NY. In-house development and contract monitoring is accomplished by the US Army Signals Warfare Laboratory, Warrenton, VA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Project: #D906
Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare/Counter C^3

Title: Division Tactical Electronic Support Measures Systems
Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

1. FY 1978 and Prior Accomplishments: Development of the (was completed, Development Test (DT) II and Operational Test (OT) II were completed, the system type was classified and a procurement contract was awarded. Development of the was initiated.

2. FY 1979 Program: None Planned. Systems were transferred to the National Security Agency under PE 3.10.11.G.

3. FY 1980 Planned Program: Full-scale development of

4. FY 1981 Planned Program: These systems are currently programmed by the National Security Agency in PE 3.10.11.G in FY 1981.

5. Program to Completion: This is a continuing program. Tasks will normally progress from advanced development program 6.37.45.A/D905 (Tactical Electronic Support Measures Systems).

Project: #D906 — Title: Division Tactical Electronic Support Measures Systems

Program Element: #6.47.45.A — Title: Tactical Electronic Warfare Systems

DoD Mission Area: #445 - Electronic Warfare/Counter C^3 — Budget Activity: #4 - Tactical Programs

6. Major Milestones:

Task Name	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
[redacted]	Type Classification	[redacted]	Not Shown
	Type Classification		Not Shown

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	[redacted]				Continuing	Not Applicable
Funds (as shown in FY 1979 submission)					Continuing	Not Applicable

*Originally shown in PE 3.10.11.G for FY 1980

Quantities: Not Applicable

Other Appropriations**						
Other Procurement, Army						
Funds (current requirements)	0	0	0			
Funds (as shown in FY 1979 submission)	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown
Quantities (current requirements)	0	0	0	[redacted]		
Quantities (as shown in FY 1979 submission)	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown

** Funds/Quantities shown are for

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project. #D909 — Title: Tactical Electronic Surveillance System
Program Element: #6.47.45.A — Title: Tactical Electronic Warfare Systems
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control and Communications (C^3) — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: This program supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program (Part B) engineering development (ED) work which is directed toward developing a tactical support system to collect, process, and disseminate electronic intelligence/information which locates and identifies enemy units, activity, and targets representing a general tactical threat. Data originating from a variety of and tactical electronic surveillance sensors must be transmitted to central field processing points where the data can be processed and analyzed. The resulting tactical intelligence must then be rapidly disseminated and fuzed into the command and control environment in such a timely and useful form so as to materially influence the land battle. Techniques and equipment which provide for this rapid collection, transmission and manipulation of intelligence data are being developed under this program.

B. RELATED ACTIVITIES: Technological developments designed to shorten the time required to collect and disseminate information are related to this development. These areas include automated search procedures, data link technologies, tactical identification and positioning, data reduction and filtering. The use of satellite communications is being considered. The initial efforts to provide the technical basis for the equipment and techniques are addressed under PE 6.37.45.A, D907, Tactical Electronic Surveillance Systems. This work is coordinated with the appropriate offices at the level and through this means, duplication of effort is avoided.

C. WORK PERFORMED BY: Aerospace Corporation, El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; US Army Communications Research and Development Command, Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Not Applicable.

2. FY 1979 Program: Initiate fabrication and engineering development of two prototype Interim Tactical Elint Processing (ITEP) systems. These will be utilized for operational evaluation and producability engineering. All necessary experimental work was completed under Program Element 6.37.45.A, D907, Tactical Electronic Surveilliance System.

Project: #D909 — Title: Tactical Electronic Surveillance System

Program Element: #6.47.45.A — Title: Tactical Electronic Warfare Equipment

DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control and Communications (C^3) — Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: Complete fabrication and deployment of two prototype systems. Initiate software upgrade program to insure continued prototype compatability with rapidly evolving sensor systems feeding the system. Continue Engineering Development (ED) of modifications to selected electronic surveillance systems to enhance utility to the tactical commander.

4. FY 1981 Planned Program: Continue software upgrade program. Funding level reflects initiation of engineering development for interface with two communications intelligence systems. All necessary experimental work will have been completed under Program Element 6.37.45.A, D907, Tactical Electronic Surveillance System.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0				Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	0				Continuing	Not Applicable
Quantities (current requirements)						Not Applicable
Quantities (as shown in FY 1979 submission)						Not Applicable
Other Appropriations:						
Other Procurement, Army:						
Funds (current requirements)	0	0	0		Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	Not Shown					

Project: #D909
Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Surveillance System
Title: Tactical Electronic Warfare Equipment
Budget Activity: #4 - Tactical Programs

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Quantities (current requirements)				Not Applicable	Not Applicable	Not Applicable
Quantities (as shown in FY 1979 submission)						Not Shown

Explanation of differences between FY 1980 and FY 1979 budget requests: The FY 1979 appropriation caused a reduction in FY 1979 resources of $2.5M in Program Element 6.37.45/D907. As a result of this deficit, certain advanced development work was deferred to FY 1980. Since this work was not accomplished in Fy 1979 as originally planned, the requirement for FY 1980 funds to support the follow-on engineering development actions was reduced.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Standoff Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	13125	36883	66460	50165	19766	211126
	QUANTITIES						4
D171	Standoff Target Acquisition System	13125	36883	66460	50165	19766	211126

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:

SOTAS is an Army program to develop an airborne target acquisition system which will provide a new capability to locate moving targets at extended ranges in hostile territory during day or night, under most weather conditions. The information will be displayed in real time at ground stations (Primary Ground Station at Division Headquarters and Secondary Ground Stations at the Brigades, the Division Artillery and the Division Forward Command Post) to permit the most timely and efficient attack of these targets. Prior to fabrication of Engineering Development (ED) hardware, the program has used existing equipment to successfully field test the concept. Extensive field testing of the existing hardware has insured that requirements are well defined.

C. BASIS FOR FY 1980 RDTE REQUEST: In FY80, the SOTAS prime contractor will complete fabrication of the ED SOTAS ground stations (primary and secondary) and will begin integrating the EH-60B, modified UH-60 BLACK HAWK helicopter, into the SOTAS. The EH-60B will complete a series of tests. These tests will establish the air worthiness and overall aerodynamic handling characteristics of the EH-60B. The SOTAS radar and data link will be fabricated and installed in the EH-60B. The SOTAS prime contractor will begin, in the 4QFY80, final system test prior to the initiation of Development Test (DT) II testing the following year.

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Standoff Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Army Systems Acquisition Review Council (ASARC) II	2QFY78	2QFY78
Defense Systems Acquisition Review Council (DSARC) II	4QFY78	3QFY78
Initiate Engineering Development (ED)	4QFY78	3QFY78
Development Test (DT) II	1QFY81	3QFY80
Operational Test (OT) II	3QFY81	2QFY81
ASARC III/DSARC III	4QFY81	4QFY81
Begin Production	1QFY82	1QFY82
Initial Operational Capability (IOC)		

The major differences between this submission and the FY79 submission result from the requirement that the Request for Proposals (RFP) for the ED contract could only be released after receiving DSARC II approval. Key milestones, such as the award of the ED contract, DT II and OT II, were correspondingly delayed.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	12925	36883	27101	35328	128232

The additional funding specified in the current submission is greater than that specified in the FY79 submission as a result of: (1) incorporating the modified BLACK HAWK, EH-60B, vice the UH-1H as a part of the SOTAS. The decision to incorporate the EH-60B into the SOTAS resulted from a cost effectiveness study which showed that life cyce costs were less with the EH-60B than with the UH-1H; that the EH-60B would provide increased lift capability; that on-station mission performance time would be increased significantly; and that system operations during adverse weather would be enhanced. (2) During 4 Qtr FY78 ASARC II/DSARC II formally approved the SOTAS program for engineering development. The acquisition strategy for the engineering development program established at these reviews was to insure that sufficient testing and logistic efforts were accomplished during DT II/OT II so that a formal DT III/OT III would not be required. This strategy required that an increase in resources be applied during the FY80 and FY81 program.

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Standoff Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

E. OTHER APPROPRIATION FUNDS: ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Army:						
Funds (current requirements)	0	0	0	0	1089600	1089600
Funds (as shown in FY 1979 submission)*	0	0	0	0	58500	58500
Quantities (current requirements)	0	0	0	0	28	28
Quantities (as shown in FY 1979 submission)	0	0	0	0	5	5

* FY 1979 funds were included in Other Procurement, Army.

The cost figures used in the FY 1979 submission were based on early estimates which used converted UH-1H helicopters for the airborne platform, and which provided for only one ground station per division system. A total of only five systems were envisioned. Since January 1978, Army System Acquisition Review Council (ASARC) II and Defense System Acquisition Review Council (DSARC) II have been held. The present submission incorporates the DSARC recommendations that the BLACK HAWK helicopter be used for the airborne platform, that five secondary ground stations per division system be provided, and that a total of 28 systems be procured. The change from Other Procurement, Army, to Aircraft Procurement, Army was necessitated by the decision to procure the EH-60B.

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Sruveillance

Title: Standoff Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

F. DETAILED BACKGROUND AND DESCRIPTION: The Stand-Off Target Acquisition System (SOTAS) consists of an airborne moving target indicator (MTI) radar, a position location system, a data link, and ground data processing/data display vans. This system has demonstrated the capability to detect and accurately locate moving targets at ranges well beyond ground line-of-sight and independent of day/night/weather conditions. A significant feature of the concept, which has been verified, is its ability to store ground references radar imagery and to display that data at high data rates (time-compression) to enhance the probability of target detection and to minimize the probability of false targets. SOTAS will provide the basis for the tactically effective engagement of targets located beyond the ground line-of-sight by both Army and Air Force organic weapons systems because of its real time detection and location capability, and will insure maximum interchange and utilization of applicable technology between the two Services.

G. RELATED ACTIVITIES: Initial development efforts of SOTAS were funded in Program Element (PE)/Project 6.37.19.A, DK72, Radars. These development efforts were transferred to PE/Project 6.37.36.A, Stand-Off Target Acquisition Systems, D171 in FY 1976 to separate funding of the Stand-Off Target Acquisition System from other radars found in the previous PE. A joint Army/Air Force test was accomplished during FY 1975 and FY 1976 with the Air Force effort being conducted in PE 6.37.47.F, Low Visibility Stand-Off Target Acquisition/Strike. The joint program was initiated in FY 1975 with the Air Force applying $1.9 million to the development effort from PE 6.47.42.F, Position Location Strike System. Advanced development (AD) was completed in FY 1978 and the program has transitioned to Engineering Development (ED) in PE 6.47.48.A, Stand-Off Target Acquisition System. There is no duplication of effort for a SOTAS-like moving target indicator capability within the Army or in the Department of Defense. The SOTAS incorporates a data link currently being developed under the Modular Integrated Communication and Navigation System (MICNS) program. The MICNS program is developing common data link components for the Remotely Piloted Vehicle (RPV) program and the USAF PLS system. The aerial platform for the SOTAS is the EH-60B helicopter, a modification of the UH-60 BLACK HAWK Utility Helicopter now in production. The SOTAS will use the KG-45 Data Link Encryption Device, a standard encryption system, presently scheduled for an FY79 production contract by the National Security Agency.

H. WORK PERFORMED BY: A Project Manager has been designated by the US Army to intensively manage the SOTAS program. The in-house developing organization for this program is the US Army Electronics Research and Development Command at Ft. Monmouth, NJ, and Adelphi, MD. Additional supporting organizations are the US Army Communication Research and Development Command, Ft. Monmouth, NJ; the Communication and Electronics Materiel Readiness Command, Ft. Monmouth, NJ; the Office of the Project Manager, BLACK HAWK, St. Louis, MO; the US Army Aviation Research and Development Command, St. Louis, MO; the Troop Support and Aviation Readiness Command, St. Louis, MO; the US Army Flight Test Activity, Lakehurst, NJ; and the Army Edwards Flight Activity, Edwards AFB, CA. The prime contractor is scheduled to be determined in 3QFY79 by a formal Source Selection Evaluation Board.

The bidders are the General Dynamics-Electronics Div, San Diego, CA, which is teamed with Westinghouse Air Armament Div., Baltimore, MD; and the Motorola Co, Scottsdale, AZ, which is teamed with Computer Sciences Corporation, Moorestown, NJ, and Lockhead-Sunnyvale, Sunnyvale, CA. Prime contractor funding in FY79 is expected to be $15.5 million. Sikorsky, Stratford, CT, will provide the airborne platform EH-60B for the SOTAS. The data link is being developed under a separate Army program designated as the Modular Integrated Communication and Navigation System (MICNS). This program is scheduled to select a prime contractor for MICNS in 3QFY79. Known contractors for FY80 are General Dynamics-Electronics Div, San Diego, CA, for the Interim-Interim (I^2) SOTAS; Systems Planning Corp., Arlington, VA; Technology Sciences Corp, Santa Monica, CA; Honeywell Systems and Research Center, Minneapolis, MN; and Sikorsky Co., Stratford, CT.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: FY 1974 and prior accomplishments consisted of establishing the technical feasibility of subsystem elements of the Stand-Off Target Acquisition System (SOTAS). In FY 1975 the fabrication of the initial SOTAS system was initiated and successfully completed. The SOTAS was then tested in an instrumented tactical environment at the US Army Combat Development Experimentation Center (CDEC), Fort Ord, California. This test provided technical data that verified the capability of the SOTAS to detect, locate and conceptually engage enemy targets at ranges well beyond the Forward Edge of the Battle Area (FEBA). In FY 1976, the SOTAS was integrated with the Distance Measuring Equipment (DME) subsystem of the US Air Force Advanced Location Strike System (ALSS) and provided Moving Target Indicator (MTI) data on the locations of a ground moving target in real time to a US Air Force modular guided glide bomb.

Systems studies, man/machine simulations and analyses were conducted. A successful demonstration of the SOTAS in Korea was accomplished in FY 1976. In FY 197T, an AD model SOTAS was tested in REFORGER '76, a US Army Europe field exercise. Assessment by a using unit (1st Armored Division) was that SOTAS filled a critical surveillance and target acquisition void by providing reliable, responsive and accurate data on targets not available from any other sensor system. An advanced radar system design was completed in FY 197T.

During FY 1978, at the direction of Headquarters, Department of the Army, the Advanced Development model of SOTAS was militarized. This militarized model was designated Interim-Interim (I^2) SOTAS. It was delivered to the 3d Armored Division in Germany as an interim capability for use through 1981. The I^2 SOTAS successfully participated in Reforger 78. The SOTAS Engineering Development (ED) program was approved by an Army Systems Acquisition Review Council (ASARC) II/Defense Systems Acquisition Review Council (DSARC) II, during March and August 1978 respectively. The Required Operational Capability (ROC) for the SOTAS, USATRADOC ACN 22842, was approved 19 July 1978. A Cost and Operational Effectiveness Analysis (COEA), completed in July 1978, showed that SOTAS would significantly enhance Army capabilities. An experimental version of the ED SOTAS radar was completed and successfully tested at Ft Huachuca. The results of this test verified many of the advanced capabilities specified for the ED SOTAS radar and will be used for further verifications during the ED programs. The NATO Rationalization, Standardization and Interoperability Plan for SOTAS was submitted to the Office of the Secretary of Defense in September 1978.

2. FY 1979 Program: The Army will continue the Engineering Development (ED) program initiated in FY 1978. The prime contractors for SOTAS and Modular Integrated Communication and Navigation System (MICNS) will be selected and contracts will be awarded. Contractual agreements with Sikorsky for the SOTAS version of the BLACK HAWK helicopter, EH-60B, will be signed by the Project Manager (PM) PM BLACK HAWK. The coordinated test plan will be developed by the PM. Contractor fabrication of hardware subsystems (ground stations, airborne radar, data link, airborne platform EH-60B, and their associated software will begin. The prime contractor will demonstrate by proof-of-principle his]radar design. Additional contractual effort will be directed toward the identification of training and maintenance tasks required to support the SOTAS during Development Test (DT) II/Operational Test (OT) II scheduled to begin in FY81. General Dynamics Electronics Division will deliver the second Interim-Interim (I^2) SOTAS to the 1st Armored Division. PM SOTAS will assist the Commander, USAREUR, in the negotiation of a maintenance contract to support the deployed I^2 systems and support I^2 SOTAS participation in Reforger 1979. The PM will purchase an AN/USM-410 through PM Automated Test Systems for contractor use in developing the automated testing system for SOTAS. The NATO Rationalization, Standardization and Interoperability effort for the SOTAS will be pursued by the PM SOTAS.

3. FY 1980 Planned Program: In FY80, the SOTAS prime and MICNS contractors will provide the basic hardware elements for the initiation of hardware integration. ED components will be manufactured. The first four EH-60B BLACK HAWK helicopters will be manufactured and flight tested. One complete EH-60B will be delivered to the prime contractor for system integration and testing. Parallel efforts will integrate computer hardware and software for the primary and secondary ground stations. Contractor testing of a totally integrated SOTAS will begin in preparation for the DT II/OT II tests scheduled for 2QFY81.

4. FY 1981 Planned Program: Contractor testing of the SOTAS will be completed. The remaining four EH-60B's will be delivered to the prime contractor for system integration. Formal DT II testing will begin at the contractor's plant in 2QFY81. The formal DT II testing by the government will be conducted 2/3QFY81 at White Sands Missile Range (WSMR). Training of military personnel in preparation for OT II will begin in 2QFY81. Formal OT II testing will take place 3QFY81 at Ft Riley, KS. Formal reliability testing will take place 3QFY81. A joint USA/USAF test will be conducted concurrently with DT II testing at WSMR. Reliability, availability and maintainability (RAM) test data will be collected concurrently throughout the entire test period. A test will be conducted to determine if the electronically scanned (E-Scan) antenna improved operational capabilities over the mechanically scanned antenna system. The ED program will be completed. Army System Acquisition Review Council (ASARC) III/ Defense System Acquisition Review Council (DSARC) III will be conducted 4QFY81.

5. Program to Completion: The four ED systems will be delivered to Germany based US Divisions (3d and 8th Infantry and 1st and 3d Armored) during 1QFY82 for use until the production systems are delivered After ED delivery the two I^2 SOTAS systems will be returned to CONUS for refurbishing and delivery to Korea as an interim capability. A contract for production versions of the EH-60B will be awarded to Sikorsky in 1QFY82. A contract will be awarded to the ED prime contractor for the production of 12 production systems (10 operational and two training) during 2QFY82.

J. TEST AND EVALUATION DATA:

1. Development Test and Evaluation:

a. The Advanced Development contractor for SOTAS is General Dynamics.

b. Development Test I (DT I) for SOTAS was accomplished on the Advanced Development system in four phases. The first phase, conducted during 4th quarter FY 1975, consisted of tests at the Combat Development Experimental Command (CDEC), located at Fort Hunter-Liggett, CA. Results of tests provided a data base for the Air Force Multilateration Radar Surveillance Strike System Program. Measurements of SOTAS accuracy as a function of range and other parameters, and performance data on SOTAS in a so-called "mini-war" depicted SOTAS capability to operate in a simulated tactical environment. The second phase of development test I was conducted in a joint exercise with the Air Force at White Sands, NM, during the second quarter of FY 1976. In this test the SOTAS functioned as a target locator and interfaced with the Air Force's Advanced Location Strike System (ALSS), which directed an inert guided glide bomb (GBU 15) to a designated target. The third phase of DT I involved a test in Korea during the 4th quarter, FY 1976. In Korea, SOTAS demonstrated the capability to provide real time information, with the number of detected targets exceeding that detected by any other sensor available within the Korean area of operations. The fourth and final phase of DT was accomplished during FY 197T when the SOTAS was operated in a tactical environment with the 1st Armored Division during REFORGER '76 in Europe. The results of that test clearly established the capability of the SOTAS to detect and locate tactical moving ground targets, in real time, in a European environment. An independent evaluation of the adequacy of developmental testing was conducted by the US Army Materiel Systems Analysis Agency (AMSAA) that concluded, after reviewing the data from the various test phases, that the test requirements for a DT I test had been met.

c. Development Test (DT) II is scheduled to start in 1st quarter, FY 1981.

2. Operational Test and Evaluation:

a. Experimentation and testing was conducted on the Advanced Development system in two phases. The first phase was conducted in Korea in March 1976 during which SOTAS demonstrated the capability to perform satisfactorily in a tactical environment. The second and major phase was conducted during the major US Army, Europe, field exercise, REFORGER '76, (August - October 1976). During the test, SOTAS was operated by cadre selected from Army Training Schools. Contractor personnel were present only to provide system maintenance. Duration of the field training exercise (FTX) was 14 days. During this period SOTAS performed as an organic element of the 1st Armored Division. It successfully provided (during both day and night) real time data on the movement and location of enemy forces. Comments of the 1st Armored Division in the field training exercise (FTX) were very supportive of the SOTAS concept. Data was collected, independently on the materiel developer, by the US Army

Training and Doctrine Command (TRADOC) data collection team led by representatives of the Combat Development Experimentation Command (CDEC), Fort Ord, CA, on system performance, mobility, and reliability. An independent evaluation of all field data by the TRADOC Systems Analysis Agency (TRASANA) stated that OT I requirements had been met. Based upon an independent assessment of test results, the Operational Test and Evaluation Agency (OTEA) concluded that a waiver of OT I could be approved, and OT I was subsequently waived.

b. Operational Test (OT) II is scheduled to be conducted in the 3d quarter, FY 1981. The hardware configuration to be tested at that time will consist of engineering models of the airborne radar integrated in a UH-60A helicopter, and engineering models of the Master and Remote Ground Display Systems. It is anticipated that four Engineering Development models, each consisting of two airborne units, one data link, and one Master and one Remote display station, will be available for test. Following the OT II tests, these models will be deployed overseas for use by an operational unit prior to availability of production items. This deployment will provide a factual basis for any modifications that may be required in production, while simultaneously providing an interim capability to the field.

3. Systems Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance (Feasibility Model DT I/OT I)
Range (0.9 probability of detecting moving tank sized target)		
Accuracy		
Endurance	2-4 hours, IFR	1 hour, VFR only
Target Types	Tanks, Trucks, Helicopter,	Tanks, Trucks, Helicopter, Walking Man
Target Velocity		

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

Operational/Technical Characteristics	Objectives	Demonstrated Performance (Feasibility Model DT I/OT I)
Type of Scan	X-band coherent mechanical and/or electronic	Mechanical Scan
Rain Performance	Essentially rain independent	Quantified field test not conducted
Electronic Counter-Countermeasure (ECCM) Capability	Defense Intelligence Agency threat responsive	

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.50.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C^3)

Title: Tactical Electronic Countermeasures Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL12	Division Tactical Electronic Countermeasures Systems					Continuing	Not Applicable
DL13	Corps Tactical Electronic Countermeasures Systems					Continuing	Not Applicable
D540	Protective Electronic Warfare Systems					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses the development of electronic countermeasures equipment and systems mounted in both ground vehicles and aircraft. These electronic countermeasures (ECM) systems and equipment are for use by division, corps, and higher commanders. The capability to employ effective ECM is critical for success in a future land battle since the enemy can be expected to have weapons generally as effective as our own, and in greater numbers, at least in the early stages of conflict. Accordingly, a capability to degrade or deny hostile forces the effective use of their communications, countermortar/counterbattery and surveillance radars and infrared/optical battlefield surveillance systems could be a decisive element of the battle. The systems under this program provide the Army with this capability and can act as force multipliers to offset hostile numerical and firepower superiority. Existing Army ECM systems must be replaced

Program Element: #6.47.50.A
DoD Mission Area: #445 - Electonic Warfare/Counter Command, Control, and Communications (C^3)

Title: Tactical Electronics Countermeasures Systems
Budget Activity: #4 - Tactical Programs

C. BASIS FOR FY 1980 RDTE REQUEST: Continue development of the [illegible] Begin engineering development of expendable communications jammers.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	[illegible]	[illegible]	[illegible]	Continuing	Not Applicable

Decrease in FY 1979 of $1800K is due to termination of AN/ULQ-14 (Multews-Ground) program.
Decrease in FY 1980 is due to budgetary constraints, which preclude funding of desired efforts in project D540.

E. OTHER APPROPRIATION FUNDS ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army*						
Funds (current requirements)	0	0	[illegible]			[illegible]
Funds (as shown in FY 1979 submission)	Not shown	Not shown	Not shown	Not shown	Not shown	Not shown
Quantities (Current requirements)	0	0	[illegible]			[illegible]
Quantities (as shown in FY 1979 submission)	Not shown	Not shown	Not shown	Not shown	Not shown	Not shown

*Funds/Quantities shown are for [illegible]

Program Element: #6.47.50.A Title: Tactical Electronics Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C3) Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct full-scale development of tactical electronic countermeasures (ECM) equipment and systems to deny or degrade the enemy's use of his electromagnetic devices. Equipment developed includes ground vehicular mounted and airborne ECM systems.

G. RELATED ACTIVITIES: Related electronic warfare developments are conducted by the Navy and Air Force. Navy developments are conducted in Program Elements 6.45.54.N, Surface Electronic Warfare; 2.45.75.N, Electronic Warfare Support; and 6.45.73.N, Shipboard Electronic Warfare Improvements. Air Force developments are conducted in Program Elements 6.47.38.F, Protective Systems; 6.47.39.F, Tactical Protective Systems; and 6.47.10.F, Reconnaissance Electronic Warfare Systems. Coordination is effected between the Services to minimize duplication of effort and ensure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering, through the exchange of technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services.

H. WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Greenville, TX; Collins Telecommunications (Division of Rockwell International) Dallas, TX; and GTE-Sylvania, Mountain View, CA. In-house development and contract monitoring is conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; and the US Army Signal's Warfare Laboratory, Vint Hill Farms Station, Warrenton, VA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments:

Program Element: #6.47.50.A Title: Tactical Electronics Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C3) Budget Activity: #4 - Tactical Programs

2. FY 1979 Program: Development Test Type II (DT II) and Operational Test Type II (OT II) of the will be accomplished. Engineering development of the has begun and engineering development of the will begin. All necessary experimental work will have been performed and the proposed systems will be ready.

3. FY 1980 Planned Program: Development of the will continue; system design will be finalized, fabrication initiated, and government furnished equipment will be obtained and provided to the Engineering development of the will continue. Development of an will begin; all necessary experimental work will have been performed, and the proposed system will be ready for full-scale development.

4. FY 1981 Planned Program: Engineering Development of the will continue. Development of the will be and the system will be tested, type classified, and procured. Engineering development will continue. A product improvement program will be initiated; all necessary experimental work will be performed, and the proposed product improvement will be ready for full-scale development.

5. Program to Completion: This is a continuing program. Developments under this program element will normally have been transferred from advanced development, Program Element 6.37.55.A, Tactical Electronic Countermeasures Systems.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DL12 Title: Division Tactical Electronic Countermeasures Systems
Program Element: #6.47.50.A Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to conduct the engineering development, testing and type classification action for tactical electronic countermeasures (ECM) equipment and systems

of immediate value to the commander. Overcoming current equipment deficiencies

is of prime importance to the Army tactical commander. This project provides for the orderly development of future systems to counter a changing threat and to replace systems now fielded, and provides for tactical systems which, by exploiting technical superiority, will serve as force multipliers to assist in offsetting WARSAW PACT numerical, mobility and firepower superiority. A complementary mix of airborne and high-survivability ground assemblies will provide twenty-four hour, all-weather, coverage in depth.

B. RELATED ACTIVITIES: Related electronic warfare developments are conducted by the Air Force and Navy. Coordination is effected between the Services to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering, through the exchange of RDTE resume cards and technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services.

C. WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Greenville, TX, and Collins Telecommunications (Division of Rockwell International), Dallas, TX. In-house development and contract monitoring is accomplished by the US Army Signals Warfare Laboratory, Warrenton, VA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments:

Project: #DL12 Title: Division Tactical Electronic Countermeasures Systems
Program Element: #6.47.50.A Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter C^3 Budget Activity: #4 - Tactical Programs

2. FY 1979 Program: Development Test Type II (DT II) of the AN/ALQ-143 will be conducted and Operational Test Type II (OT II) The system will be type classified development of will be started with contract award estimated to be not later than Engineering Technical specifications and system guidelines for engineering development will be finalized.

3. FY 1980 Planned Program: Engineering development will continue. Engineering development will start with award of a contract estimated for All necessary experimental work will have been performed will be ready for full-scale development.

4. FY 1981 Planned Program: DT II/OT II will be conducted. The system will be type classified and initial procurement initiated. Engineering development will be continued.

5. Program to Completion: This is a continuing program. Tasks will normally progress from advanced development program 6.37.55.A/DK12 (Division Tactical Electronic Countermeasures Systems).

6. Major Milestones:

Task Name	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
	Type Classification		

Delay in AN/ALQ-143 Type Classification is due to problems encountered in flight certification testing. System antenna mounting is being repositioned to reduce aerodynamic drag, thereby correcting the problem. System will be retested.

	Type Classification		

Project: #DL12 — Title: Division Tactical Electronic Countermeasures Systems
Program Element: #6.47.50.A — Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter C^3 — Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A						
Funds (current requirements)					Continuing	Not Applicable
Funds (as shown in FY 1979 submission)					Continuing	Not Applicable
Quantities: Not Applicable						

*Difference in FY79 is due to termination of AN/ULQ-14 (Multews-Ground) Program.
**Difference between previous and current FY1980 RDTE estimates is due to decision

Other Appropriations***						
Other Procurement, Army						
Funds (current requirement)	0	0	0			
Funds (as shown in FY 1979 submission)	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown
Quantities (current requirement)	0	0	0			
Quantities (as shown in FY 1979 submission)	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown

*** Funds/Quantities shown are for

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5513	9509	15503	25100	Continuing	Not Applicable
	Quantities						32
D168	NAVSTAR GPS EQUIPMENT	5513	9509	15503	25100	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Currently, the map and compass and conventional survey techniques provide the positioning and navigation function to the combat forces. If the Army is to increase its effectiveness in a highly mobile battlefield environment as protrayed in emerging tactical doctrine, it must be able to accurately navigate and determine the position of its weapons systems under conditions of adverse weather, day or night, in all environmental conditions, worldwide. The NAVSTAR Global Positioning System (GPS) will provide that capability. GPS will consist of 24 satellites, a Master Ground Station, and user equipment in vehicles, ships, airplanes, and manportables. The system will provide global, highly accurate information which will serve a broad spectrum of military navigation and positioning missions. This effort includes common modular units that can be easily integrated into weapons and ordnance delivery systems for NATO and US forces. This program addresses the Army's participation in the Joint Program Office (JPO) for the Phase II efforts, i.e., full-scale development of manpack, vehicular, and aircraft equipments.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds are required to continue the full-scale development contracts for a family of manpack, vehicular, and aircraft sets. In addition funds are required for internal Army Support, Test Planning, Operational Test Vehicle Modification and Logistics Planning. A production decision and initial operational capability are scheduled for 1982 and 1985, respectively.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL BUDGET REQUESTS: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	5513	9509	7703	Continuing	Not Applicable
					32

Program Element: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

More up-to-date information concerning development effort, technology required, and software effort involved to complete full scale development was utilized in latest FY 1980 cost estimates. Estimates were based on better definition of the scope of the full-scale development program. Cost estimates also increased due to more definitive information concerning integrating NAVSTAR GPS user equipment into vehicles and aircraft for operational testing. The major increases in program costs are associated with a change in procurement strategy. Previous estimates were made based on a single contractor approach for full scale development. Present estimates are based on a two contractor, competitive development approach.

E. OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Related Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: Fundamental to the successful accomplishment of military functions is the ability to precisely position friendly forces relative to each other and with respect to enemy forces. Over the years, the Services have developed numerous positioning and navigation aids to satisfy specific requirements and to increase the effectiveness of their weapons systems. Technology available at the time these systems were developed tended to limit their use to specific applications with only a minimum of integration possible. Further improvements in their military utility is constrained by accuracy limits, extent of geographic coverage, and dependence on foreign base rights. Extensive studies, analyses, and tests by all the Services have confirmed the feasibility of a single, highly-precise, satellite-based positioning system capable of satisfying a broad spectrum of positioning requirements. The objective of the system is to provide the precision required for accurate weapons delivery, in all weather conditions, day or night, anywhere. The NAVSTAR Global Positioning System will provide unprecedented accuracies of position and velocity in three dimensions, i.e., position within 10 meters and velocity within 0.03 meters per second. The 24 satellites will be in 17,600 kilometer orbits. This will greatly enhance military capabilities for navigation and position fixing. The NAVSTAR program was approved for concept validation at DSARC-I in Dec 1973.

G. RELATED ACTIVITIES: This is a joint program with all Services participating. The Air Force is the executive Service. Funding for Phase I, Concept Validation, is derived from program elements 6.34.03.A, 6.34.01.N, and 6.34.21.F, NAVSTAR Global Positioning System (GPS). Phase II efforts for user equipment are in program elements 6.47.78.A, 6.47.78.N, 6.47.78.F, and 6.47.19.M. The Phase II NAVSTAR space and control segments are funded by program element 6.44.78.F. The Program Manager for the Joint-Service Program coordinates the supporting activities of the Army, Navy, Air Force, Marine Corps, Defense Mapping Agency, and NATO through his Service and NATO deputies to provide cohesive and complementary development, test, and evaluation of the NAVSTAR Global Positioning System.

H. WORK PERFORMED BY: Contracts for this program element will not be awarded until after DSARC II scheduled for May 1979. Internal Army effort is provided by the US Army Communication Research and Development Command (CORADCOM) at Ft Monmouth, NJ.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Studies were conducted to determine operational characteristics, performance parameters, and equipment characteristics to meet Army requirements and applications. A Materiel Need with supporting technical plan and cost analysis was prepared and approved for a family of user equipment to satisfy a broad spectrum of Army requirements. The Joint Program Office awarded a contract on 23 October 1974 to General Dynamics Corporation for study and fabrication of ground control systems and joint Service airborne, vehicle, and manportable user system equipments. The Army is to get ten advanced development models of three different types of user equipment. Advanced development contracts were initiated for competitive development of manpack equipment in June 1975 for two sets from Texas Instruments and in March 1976 for four models from Magnavox. Flight tests, vehicular tests, and manpack tests were conducted at the Army's Yuma Proving Ground, using both a ground based simulation facility and three operational satellites. Results of these tests were excellent. Both the

Magnavox and Texas Instruments manpacks successfully determined position to an accuracy of less than 10 meters. The radiated power from the satellites was about 80% better than expected. All of these efforts were funded under the Phase I program elements.

2. FY 1979 Program: Following a review by the DSARC in mid FY 1979, full-scale development contracts will be initiated for the full family of manpack, vehicular and aircraft equipment. Efforts will be continued to: identify and scope user equipment vulnerability in the Army environment; develop retrofit kits for wheeled, and tracked vehicles, and existing aircraft and for new land, sea, and airborne vehicles; develop maintenance and repair philosophy for implementation in existing Army logistical systems; and participate in Joint Service computer software refinement programs. The manpack vehicular and aircraft sets will provide the user with unprecedented accuracies of position and time, and widespread commonality and interoperability.

3. FY 1980 Planned Program: Contractor development of new equipment will continue. Hardware and software will be produced and contractor testing of equipment will be initiated. Development of retrofit kits for vehicles and aircraft will continue and integration of user equipment sets into vehicles and aircraft will be initiated. The logistics concept, including training, maintenance, and supportability, will be completed. Test equipment for user set maintenance will be developed.

4. FY 1981 Planned Program: Development of user sets, associated software, retrofit kits, and test equipment will be completed. Development testing and Operational testing will be initiated, to include evaluation of the logistics concept.

5. Program to Completion: Plans call for continued support of the NAVSTAR program and the initiation of production of user equipment sets for manpack, vehicular, and aircraft use. Global Positioning System equipment will also be made available to NATO and selected allied nations so that they may achieve similar objectives and benefits.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4200	13520	29997	30216	Continuing	Not Applicable
D298	JINTACCS (NATO)	0	2000	2000	2000	Continuing	Not Applicable
D309	JINTACCS (Army)	1300	4320	15805	14035	Continuing	Not Applicable
D310	JINTACCS (Executive Agent)	2900	7200	12192	14181	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a new program element starting in FY 1979. This program provides for accomplishment of those unique tasks required of the Chief of Staff, US Army, to perform the mission of Executive Agent for the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Program. This program element includes all funds for accomplishment of Army responsibilities in the JINTACCS Program. Funds for FY 1978 for accomplishment of the Executive Agent's mission, as outlined above, were included in Program Element (PE) 6.47.47.A, Joint Compatibility and Interoperability. An urgent requirement exists for the Services' automated tactical command and control systems to be compatible and to interoperate in joint military operations. The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) Program was established to meet this requirement for six operational systems. The JINTACCS Program, formerly the Ground and Amphibious Military Operations (GAMO) Program, was established to meet this requirement for all other tactical systems of the Services and for future systems and to assume the TACS/TADS responsibilities when a full test capability is attained by the JINTACCS Program. These programs now provide the only means available to the Secretary of Defense to assure interoperability among Joint Service automated systems. JINTACCS will also provide a technical capability for addressing and coordinating US/North Atlantic Treaty Organization (NATO) interoperability requirements for tactical command and control systems.

C. BASIS FOR FY 1980 RDTE REQUEST: The primary objective of the Executive Agent for FY80 is twofold: to acquire a full test capability and to complete the planning phase for US/NATO tactical systems interoperability under the NATO initiatives effort. Concurrently, Intelligence Systems testing will continue to completion, assumption of the TACS/TADS program workload will start, and the JINTACCS data base for message standards will be realigned for use as the initial baseline and reference point for NATO efforts. Funding is urgently required for the establishment and maintenance of an Army interoperability test bed. This Army Test Unit (ATU), is a critical need which must be satisfied before the Army can participate with other services in the JINTACCS program.

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Begin compatability and interoperability testing of intelligence segment	July 1979	June 1979
Begin compatability and interoperability testing of operational segment	January 1981	October 1980
Begin compatability and interoperability testing of operation control segment	January 1982	Not shown in FY 1979 submission
Begin compatability and interoperability testing of amphibious/fire support segment	July 1983	June 1983

Current milestone dates differ from those shown in the FY 1979 submission due to the fact that additional time was required to allow for the development of the methodology to be used in the consideration of NATO requirements.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4262	13520	18572	Continuing	Not Applicable

The following rationale was used to derive differential funding estimates between the FY 1979 and FY 1980 submissions: (a) Assignment of total Army Test Unit (ATU) responsibility to HQ CORADCOM by HQDA during FY 1978. This responsibility was originally a support role for CORADCOM with Intelligence testing support at Ft. Monmouth, NJ; (b) Additional interface requirements identified by the Army user during the development of the joint interfaces, such as addition of Army operational facilities and remote test sites; (c) The newly refined requirement of supporting the development of the Joint Tactical Information Distribution System - Message Standards as directed by the Joint Chief of Staff; (d) Absorption of the Tactical Air Control System/ Tactical Air Defense (TACS/TADS) into the JINTACCS Program; (e) Execution of program restructuring and Joint Test Schedule acceleration as directed by Congress; (f) Further refinement of the JINTACCS decentralized testing concept created additional requirements. The other services participating in JINTACCS further defined their remote test sites requiring additional Army communications and personnel resources. The Army identified their interoperability post deployment software support centers that will be decentralized causing increases in Army resources to support testing and configuration management of Army Operational Facilities and systems participating in JINTACCS.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The Joint Ground and Amphibious Military Operations (GAMO) program was established by the Joint Chiefs of Staff (JCS) on 1 April 1971 to achieve compatibility and interoperability of the tactical command and control systems to be used by the Services in support of Joint military operations. The Chief of Staff, US Army, was assigned the responsibility to accomplish the joint aspects of this program as the Executive Agent for the JCS with the program to be accomplished in three phases: Phase I - conceptual phase; Phase II - planning phase; and Phase III - joint testing and demonstration phase. Effective 1 August 1977, this program was reorganized and designated the "Joint Interoperability of Tactical Command and Control Systems (JINTACCS)" Program. This program will develop the technical standards necessary for compatibility and interoperability of 30 different tactical command and control systems of the Services and Agencies, 38 different tactical facilities and will conduct joint testing of over 84 major interfaces between these systems and facilities. In reorganizing this program, the Secretary of Defense directed that the management structure be strengthened to expedite accomplishment of the program. This strengthing of the management structure was completed.

G. RELATED ACTIVITIES: This program is related to the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) program which is funded under Program Element 6.47.12.A, Joint Advanced Tactical Command, Control, Communications Program.

H. WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program is accomplished by the JINTACCS Program Director and the JINTACCS System Engineering Office which are located within the Office, Assistant Chief of Staff for Automation and Communications (OACSAC), of the Army Staff. The JINTACCS System Engineering Office is supported by the Joint Service/Agency Support Office (JSASO) which consists of two full-time representatives from each Service and one full-time representative each from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the Joint Service/Agency Support Office. The Joint Interface Test Force (JITF) has been formed and is located at Fort Monmouth, NJ. Incremental expansion of the JITF to an 85-man organization will continue over the next year. The initial increment to establish a staff capable of performing joint testing was assembled during FY 1978. Management of the JINTACCS (Army) program is provided by the Communications Research and Development Command, Fort Monmouth, NJ.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The Ground and Amphibious Military Operations (GAMO) Management Office, the Joint Planning Group, the Interface Coordination Committee, and the Joint Management Committees were established prior to February 1976. In addition, the Joint GAMO Management Plan, the GAMO Technical Interface Concepts Plan, and the GAMO Implementation Plan were prepared and approved. Program Memorandum No. 99 outlining the Ground and Amphibious Military Operations (GAMO) program was prepared and approved, and a generalized Technical Interface Plan was prepared. In February 1976, the GAMO program was redirected to achieve a joint testing capability as early as possible by dividing the systems of the Services into four functional groups (Intelligence, Air Operations, Amphibious and Fire Support, and Operations Control) and by placing priorities on these groups for testing. During 1976, the Technical Interface Concepts Document was revised, a Joint Interface Test Center (JITC) site selection

study completed, other Ground and Amphibious Military Operations (GAMO) documentation revised to reflect the program orientation, and the Commander-in-Chief, Atlantic was designated to accomplish GAMO operational effectiveness demonstrations. During FY 1977, the Joint Interface Test Center site at Fort Monmouth, NJ was designated, Program Memorandum 99 was revised to reflect changes in the program resulting from budgetary actions, and the Intelligence Group Technical Interface Design Plan was completed. Responsibility for development of joint message standards for the Joint Tactical Information Distribution System (JTIDS) was added to the program. The Army participated in joint activities, investigated emulation techniques relative to joint testing, and planned Army unique support for the program. In 1977, Congress deleted all but $1.000 million from the FY 1978 program pending reorganization of the GAMO program into the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program with permission for reprograming once the reorganization was accomplished. Reorganization was completed in 1977 and reprograming action for additional FY 1978 funds was completed in January 1978. Based on a program level of $2.900 million ($1.000 million basic and $1.900 million reprogramed), the following work was accomplished: The Joint Interface Test Force (JITF) staff was expanded by the Services/Agencies and an initial procurement of equipment was initiated for Intelligence Interface Testing. All program documentation has been revised to reflect reorganization of the program. Program Memorandum 99 is being revised to reflect program and fiscal changes in the program. Building 1209 at Fort Monmouth, NJ, is being modified to provide a Joint Interface Test Center (JITC), test plans are being prepared for joint intelligence testing, engineering support will be provided for the JITF, and technical interface design plans will be prepared for the other functional groups. Policies and procedures are being developed and directives issued to cover restructuring the program from GAMO to JINTACCS, development of message standards for the JTIDS is continuing, and the extent to which the JINTACCS program will become involved in North Atlantic Treaty Organization (NATO) standardization activities is being determined. During 1978, the Army will complete Army test site activation, staff the Army test unit, continue emulation of Army systems participating in joint testing, and participate in joint activities.

2. FY 1979 Program: The JITC will be activated, testing hardware and communications equipment will be delivered and installed, joint test plans will be completed and joint preliminary testing of the Intelligence Group will start. The JITC system design plan and the test proposal will be completed, plans for testing of the Air Operations Group will be initiated, initial test results of the Intelligence Group will be evaluated and configuration management of developmental standards will start. In addition, a plan for transition of Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) functions into JINTACCS will be completed and documents will be revised such as the Management Plan, JINTACCS Data Elements Dictionary, and the JITF organizational plan. Tasks relating to NATO initiatives will be defined and accomplished. The Army will participate in joint activities, Intelligence Group testing, and continue emulation activities and modification of Army systems for joint testing. Increased funding over the FY 1978 level is due to the activation of the JITC and the delivery and installation of communications equipment.

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: Preparation and refinement of Technical Interface Design Standards, Joint Interface Test Plans, engineering studies, and configuration management plans and will continue. Operation of the JINTACCS System Engineering Office, the Joint Service/Agency Support Office, the Joint Interface Test Force, joint technical working groups, and other joint organizations will continue. The Army will prepare systems and participate in interface testing of the Tactical Operation System/Position Locating and Reporting System, Tactical Fire Control System/Remotely Piloted Vehicle, Tactical Fire Control System/Control and Analysis Center, and the Tactical Operations System/Remotely Monitored Battlefield Surveillance System. Increase in funding over the FY 1979 level is due to the assumption of the remaining Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) program responsibilities by the JINTACCS program, the acquisition of additional equipment, and increased level of testing.

4. FY 1981 Planned Program: Air operations testing is scheduled to start in January 1981 and continue throughout the year. An Operational Effectiveness Demonstration (OED) for intelligence systems is scheduled for May 1981 as part of a Joint Service exercise under Commander-in-Chief, Atlantic. Data base and program documentation will continue to be updated.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D309 — Title: Joint Interoperability of Tactical Command and Control Systems (Army)

Program Element: #6.47.79.A — Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this Office of Secretary of Defense/Joint Chiefs of Staff (OSD/JCS) directed program for Joint Interoperability of Tactical Command and Control Systems (JINTACCS) is to improve the overall tactical effectiveness of the US Armed Forces in joint service/agency operations. Specifically, the JINTACCS program was established for the purpose of insuring compatibility and interoperability (C&I) of tactical command and control systems used in joint operations. NATO tactical command and control requirements will be considered. The Army as one of the participating services and agencies is tasked to provide support to the JINTACCS Program, and to program and budget funds necessary to accomplish its portion of the program. The Army also is executive agent for the JINTACCS Program. The tasks and resources required for Army participation in JINTACCS are described below; the tasks and resources for the executive agent activities are described in the JINTACCS descriptive summary for Program Element (PE) 6.47.79/D310 (JINTACCS (Executive Agent)). As a participant, the Army will provide operational facilities such as the Tactical Operations Center, Fire Direction Center, Army Air Defense Command Post (there are 26 such Army facilities), and supporting automated systems (consisting of the Tactical Operations System, Tactical Fire Direction System, Missile Minder, PATRIOT, and All Source Analysis System), all to be configured to exchange tactical information with other service/agency operational facilities and systems. The JINTACCS program, has been developing information exchange requirements, message formats amd data elements, communications parameters, interface points, and interface operating procedures to achieve compatibility and interoperability among joint tactical facilities and systems. Each JINTACCS participating Army facility and system must be designed or modified, to utilize JINTACCS message standards. To evaluate the achievement of compatibility and interoperability, testing will be conducted starting in the fourth quarter of FY 79. The C&I tests will be conducted in an iterative manner on each of five JINTACCS functional groups--Intelligence, Air Operations, Amphibious Operations, Fire Support Operations, and Operations Control over a period from FY 79 through FY 84. Following each functional group's C&I tests an Operational Effectiveness Demonstration (OED) will be conducted concurrently with annual joint exercises (e.g., SOLID SHIELD 81) to demonstrate the enhanced capabilities of an interoperable US joint tactical force. The JINTACCS program is a highly complex undertaking by the US, but one that will ultimately lead to joint standardization and provide force multiplier effects contributing to the US defense posture.

B. RELATED ACTIVITIES:

1. The JINTACCS program was known as the Ground and Amphibious Military Operations (GAMO) program until June 1977 when Congress recommended restructuring of the management and staffing of the GAMO program. The GAMO program was funded under the same program element as the Joint Advanced Tactical Command, Control, and Communications Program, Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS), PE 6.47.12.A-D321.

Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

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DoD Mission Area: #444 - Tactical Combat Integration Budget Activity: #4 - Tactical Programs

2. Program Element (PE) 6.47.12.A/D321, Joint Advanced Tactical Command, Control, and Communications Program (TACS/TADS). The Tactical Air Control System/Tactical Air Defense System (TACS/TADS) interface program was designed and implemented to develop and test procedures that permit interoperability among specific air defense and air control systems of the Army, Navy, Air Force, and Marine Corps.

3. PE 6.47.12.A/D323 US Army Tactical Data Systems Interoperability. This program has been established to increase the operational effectiveness of the Army's battlefield automated systems through interoperability. The JINTACCS program is both influenced by and influences the design, implementation, and testing of Army systems participating in this intra-Army interoperability program.

C. WORK PERFORMED BY: Contractors: System Development Corporation--Eatontown, NJ; Control Data Corporation--Shrewsbury, NJ. In-house organization: US Army Communications Research and Development Command, Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: CORADCOM managed the Army's participation in JINTACCS, funding support by Army Project Managers, laboratories, test activities, and contractors as related to the following:

	Accomplishments	Completion Date
(a)	Supported development of JINTACCS modifications to NATO ADatP-3 Message Format Rules for Joint Reporting Structure.	9/76-1/78
(b)	Assisted in preparation of JINTACCS Technical Interface Concept (TIC).	JCS Approved 3/77
(c)	Activated DARCOM Representation to JINTACCS Service/Agency Support Office (JSASO).	10/77
(d)	Planned for Army TACS/TADS transition into JINTACCS Management	10/77-10/80

Project: #D309

Program Element: #6.47.79.A

DoD Mission Area: #444 - Tactical Combat Integration

Title: Joint Interoperability of Tactical Command and Control Systems (Army)

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

Budget Activity: #4 - Tactical Programs

Accomplishments	Completion Date
(e) Assisted in preparation of JINTACCS Technical Interface Design Plans	
(1) Intelligence	JCS Approved 1/78
(2) Intelligence Supplement	JCS Approved 1/78
(f) Started contractual support to Army-JINTACCS Programs.	
(1) Emulation System Engineering--Control Data Corporation.	2/78
(2) System Engineering--System Development Corporation.	8/78
(3) Teleprocessing Design Center--Control Data Corporation.	9/78
(g) Assisted in preparation of JINTACCS Configuration Management Plan	Approved 3/78
(h) Provided Army inputs to Program Memorandum 99 for System Costs and Schedules.	4/78
(i) Assisted in preparation of JINTACCS Operational Effectiveness Demonstration (OED) Plans (Intell).	6/78-10/81
(j) Reviewed JINTACCS Test Documents.	
(1) Test Directive	7/78
(2) Test Plans (Basic and Intelligence)	9/78
(k) Prepared JINTACCS-Army Management Plan (JAMP).	8/78
(l) Prepared Memorandum of Understanding for Army TACFIRE-Marines MIFASS Interface.	9/78
(m) Started preparation of JINTACCS Technical Interface Design Plans (TIDP-TE).	Expected JCS Approval

Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

Program Element: #6.47.79.A Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration Budget Activity: #4 - Tactical Programs

Accomplishments	Completion Dates
(1) Joint Tactical Information Distribution System (JTIDS).	11/78
(2) Amphibious Operations	11/79
(3) Air Operations	5/80
(4) Fire Support	5/80
(5) Data Communications Appendix	6/80
(6) Operations Control	8/80
(n) Supported Battlefield Exploitation and Target Acquisition (BETA, implementation of JINTACCS Messages.	Expected completion-12/78
(o) Started development of Army Plans for Intelligence Compatibility and Interoperability (C&I) Tests.	Expected completion-3/79
(p) Assisted in preparation of JINTACCS Message Element Dictionary/ Catalog of Keyword Sets (MED/CAT).	Expected JCS Approval-5/79
(p) Assisted in preparation of JINTACCS Interface Design Handbook for Intelligence.	Expected completion-5/79
(r) Contributed to development of JINTACCS-NATO AD HOC Group (JINAG) Management Plan.	Expected completion-3/80
(s) Assisted in preparation of Technical Interface Concepts (TIC).	Expected JCS Approval-5/80
(t) Developed Army Test Unit Plans.	1/78-10/78

2. FY 1979 Program: CORADCOM manages the Army's participation in JINTACCS, funding support by Army Project Managers, laboratories, test activities, and contractors, as related to the following: Update and refine the JINTACCS Army Management Plan (JAMP); Review JINTACCS Technical Interface Concept (TIC); Assist in preparation of JINTACCS Technical Interface Design Plans; Activate the Army Test Unit; Review JTIDS Technical Interface Concept; Review JINTACCS Test Documents; Develop Army plans for Intelligence C&I testing; Start development of Army plans for Air Operations C&I testing; Implement JINTACCS Configuration Management Plan;

Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

Program Element: #6.47.79.A Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration Budget Activity: #4 - Tactical Programs

Assist in preparation of JINTACCS Message Element Dictionary/Catalog of Keyword Data Sets (MED/CAT); Assist in preparation of JINTACCS Interface Design Handbook; Contribute to development of JINTACCS-NATO AD HOC (JINAG) Management Plan; Support Battlefield Exploitation and Target Acquisition (BETA) implementation of JINTACCS messages; Provide Army input to Program Memorandum 99 for System Costs and Schedules; Provide full time US Army Materiel Development and Readiness Command (DARCOM) representative to JINTACCS Service/Agency Support Office (JSASO); Provide full time Army representatives to JINTACCS Joint Interface Test Force; Plan for Army Tactical Air Control System/Tactical Air Defense System (TACS/TADS) transition into JINTACCS; Assist in preparation of plans for JINTACCS Operational Effectiveness Demonstration (OED); Provide for contractual support for: (1) JINTACCS System Engineering; (2) Emulation System Engineering; (3) Emulator Expansion; (4) Army Test Unit, Federal Contract Resource Center (FCRC); Provide technical support to the JINTACCS communications analysis and design; Coordinate with Army Project Managers and TRADOC System Managers to provide for timely integration of JINTACCS standards into participating Army systems; Provide for operational facility/system training program for Army support of JINTACCS C&I testing.

3. FY 1980 Planned Program: CORADCOM will manage the Army's participation in JINTACCS, funding support by Army Project Managers, laboratories, test activities, and contractors as related to the following: Update and refine the JINTACCS Army Management Plan (JAMP); Review JINTACCS Technical Interface Concept (TIC); Initiate Army test site survey and plan for JINTACCS Operations Control C&I testing; Assist in preparation and configuration control of JINTACCS Technical Interface Design Plans; Operate the JINTACCS Army Test Unit and participate in Intelligence C&I testing; Review JTIDS Technical Interfact Concept; Review JINTACCS Test Documents; Develop Army plans for Air Operations C&I testing; Start development of Army plans for Operations Control C&I testing; Implement JINTACCS Configuration Management Plan; Assist in preparation of JINTACCS MED/CAT; Assist in preparation of JINTACCS Interface Design Handbook; Contribute to development of JINTACCS-NATO AD HOC Group (JINAG) Management Plan; Support BETA implementation of JINTACCS messages; Provide Army inputs to Program Memorandum 99 for System Costs and Schedules; Provide full time DARCOM representative to JINTACCS Service/Agency Support Office (JSASO); Provide full time Army representatives to JINTACCS JITF; assume Army TACS/TADS activities into JINTACCS; Assist in preparation of JINTACCS OED plans; Provide for contractual support for: (1) JINTACCS System Engineering; (2) Emulation System Engineering; (3) Emulation Expansion; (4) Army Test Unit, Federal Contract Resource Center (FCRC); Provide technical support to the JINTACCS communications analysis and design; Coordinate with Army Project Managers and TRADOC System Managers to provide for timely integration of JINTACCS standards into participating Army systems; Begin modifications to the TACFIRE system to interface with the US Marine Corps MIFASS system; Provide for Operational Facility/system training program for Army support of JINTACCS Intelligence and Air Operations C&I testing.

4. FY 1981 Planned Program: CORADCOM will manage the Army's participation in JINTACCS, requiring support from Army Project Managers, laboratories, test activities, and contractors as related to the following: Update and refine the JINTACCS Army Management Plan (JAMP); Review JINTACCS Technical Interface Concept (TIC); Assist in preparation and configuration control of JINTACCS Technical Interface Design Plans; Operate the JINTACCS Army Test Unit and participate in Intelligence and Air Operations

Project: #D309 | Title: Joint Interoperability of Tactical Command and Control Systems (Army)

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C&I testing; Review Joint Tactical Information Distribution System (JTIDS) Technical Interface Concept; Review JINTACCS Test Documents; Develop Army plans for Operations Control Compatibility and Interoperability (C&I) testing; Implement JINTACCS Configuration Management Plan; Assist in preparation of, and configuration control of JINTACCS Message Element Dictionary/Catalog of Keyword Data Sets (MED/CAT); Assist in preparation and configuration control of JINTACCS Interface Design Handbook; Contribute to development of JINTACCS-NATO AD HOC Group (JINAG) Management Plans; Support Battlefield Exploitation and Target Acquisition (BETA) implementation of JINTACCS messages; Provide Army inputs to Program Memorandum 99 for System Costs and Schedules; Provide full time DARCOM representative to JINTACCS Service/Agency Support Office (JSASO); Provide full time Army representatives to JINTACCS JITF; Assist in preparation of JINTACCS Operational Effectiveness Demonstration (OED) plans; Provide for contractual support for: (1) JINTACCS System Engineering, (2) Emulation System Engineering, (3) Emulator Expansion, (4) Army Test Unit, Federal Contract Resource Center (FCRC); Provide technical support to the JINTACCS communications analysis and design; Coordinate with Army Project Manager to provide for timely integration of JINTACCS standards into participating Army systems; Provide for Operational Facility/system training program for Army support of JINTACCS C&I testing.

5. Program to Completion: This is a continuing program. The period after FY 1981 will include compatibility and interoperability testing of all JINTACCS functional segments and Operational Effectiveness Demonstrations. By 1985 this program will have been submitted to the Joint Chiefs of Staff for approval, the Final Edition of the JINTACCS Technical Interface Design Plan which when approved will become the Joint Interface Design Standard for developing tactical data systems. It is anticipated that new automated systems will be introduced and that those in the field will be changed/updated; therefore, there will be a continuing need for interoperability configuration management for developmental and operational systems.

6. Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Interface Design	2Q FY 79	4Q FY 78
Data-Communication Specification	2Q FY 80	None
Operational Facility/System Implementation	4Q FY 80 thru 2Q FY 84	2Q FY 78 thru 2Q FY 83
Joint Tactical Information Distribution System (JTIDS)-Message Standards	1Q FY 80	2Q FY 81
Compatibility and Interoperability Testing	4Q FY 79 thru 3Q FY 83	4Q FY 79 thru 3Q FY 84

Project: #D309

Title: Joint Interoperability of Tactical Command and Control Systems (Army)

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Configuration Management Testing	2Q FY 80	None
Operational Effectiveness Demonstrations	3Q FY 81 thru 3Q FY 85	FY 82 thru FY 84
Army Test Unit (ATU)	1Q FY 79	4Q FY 79

The milestone slippages identified above are based upon funding and resource limitations resulting from an increase in JINTACCS requirements with no subsequent increase in funding. These new requirements are identified in paragraph 7, below.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1755	4320	15805	14035	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	1362	4320	6380	4406	Continuing	Not Applicable

Funding Differential Rationale Between FY 79 and FY 80 Submissions:

The following rationale was used to derive differential funding estimates between the FY 79 and FY 80 submissions: Assignment of total Army Test Unit (ATU) responsibility to HQ CORADCOM by HQDA during FY 78. This responsibility was originally a support role for CORADCOM with Intelligence testing support at Ft Monmouth, NJ; Additional interface requirements identified by the Army user during the development of the Joint interfaces, such as addition of Army Operational Facilities and Remote Test Sites; The newly refined requirement of supporting the development of the Joint Tactical Information Distribution System-Message Standards as directed by the Joint Chief of Staff; Absorption of the Tactical Air Control System/Tactical Air Defense System into the JINTACCS Program; Execution of program restructuring and Joint Test Schedule acceleration as directed by Congress; Further refinement of the JINTACCS decentralized testing concept created additional requirements. The other services participating in JINTACCS further defined their remote test sites requiring additional Army communications and personnel resources. The Army identified their interoperability post deployment software support centers that will be decentralized causing increases in Army resources to support testing and configuration management of Army Operational Facilities and systems participating in JINTACCS.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D310 — Title: Joint Interoperability of Tactical Command and Control Systems (Executive Agent)

Program Element: #6.47.79.A — Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The joint Ground and Amphibious Military Operations (GAMO) program was established by the Joint Chiefs of Staff (JCS) on 1 April 1971 to achieve compatibility and interoperability of the tactical command and control systems to be used by the Services in support of joint military operations during the 1980's. The Chief of Staff, US Army, was assigned the responsibility to accomplish the joint aspects of this program as the Executive Agent for the JCS with the program to be accomplished in three phases: Phase I - conceptual phase; Phase II - planning phase; and Phase III - joint testing and demonstration phase. Effective 1 August 1977, this program was reorganized and designated the "Joint Interoperability and Tactical Command and Control Systems (JINTACCS)" program. This program will develop the technical standards necessary for compatibility and interoperability of 30 different tactical command and control systems of the Services and agencies, 38 different tactical facilities, and will conduct joint testing of over 84 major interfaces between these systems and facilities. These programs now provide the only means available to the Secretary of Defense to assure interoperability among joint Service automated systems. JINTACCS will also provide a technical capability and will coordinate US/North Atlantic Treaty Organization (NATO) interoperability requirements for tactical command and control systems.

B. RELATED ACTIVITIES: This program is related to the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) program which is funded under Program Element (PE) 6.47.12.A, Joint Advanced Tactical Command, Control, Communications Program. The TACS/TADS interface program was designed and implemented to develop and test procedures that permit interoperability among specific air defense and air control systems of the Army, Navy, Air Force, and Marine Corps. In FY 1981 the TACS/TADS program will be transitioned into the JINTACCS program for configuration management.

C. WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program is accomplished by the JINTACCS Program Director and the JINTACCS System Engineering Office which are located within the Office, Assistant Chief of Staff for Automation and Communications (ACSAC), of the Army Staff. The JINTACCS System Engineering Office is supported by the Joint Service/Agency Support Office (JSASO) which consists of two fulltime representatives from each Service and one fulltime representative each from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the Joint Service/Agency Support Office which meets monthly and is composed of representatives from all Services and Agencies participating in the JINTACCS program. The Joint Interface Test Force (JITF) has been formed and is located at Fort Monmouth, NJ. Incremental expansion of the JITF to an 85-man organization will continue over the next two years. The initial increment to establish a staff capable of performing joint testing was assembled during FY 1978.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Project: #D310

Title: Joint Interoperability of Tactical Command and Control Systems (Executive Agent)

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

1. FY 1978 and Prior Accomplishments: The GAMO Management Office, the Joint Planning Group, the Interface Coordination Committee, and the Joint Management Committees were established prior to February 1976. In addition, the Joint GAMO Management Plan, the GAMO Technical Interface Concepts Plan, and the GAMO Implementation Plan were prepared and approved. Program Memorandum No. 99 outlining the GAMO program was prepared and approved, and a generalized Technical Interface Test Plan was preapred. In February 1976, the Ground and Amphibious Military Operations (GAMO) program was redirected to achieve a joint testing capability as early as possible by dividing the system of the Services into four functional groups (Intelligence, Air Operations, Amphibious and Fire Support, and Operations Control) and by placing priorities on these groups for testing. Since February 1976, the Technical Interface Concepts Document has been revised, a Joint Interface Test Center (JITC) site selection study completed, other GAMO documentation revised to reflect the program orientation, and the Commander-in-Chief, Atlantic, was designated to accomplish GAMO operational effectiveness demonstrations. During FY 1977, the Joint Interface Test Center site at Fort Monmouth, NJ, was designated, Program Memorandum No. 99 was revised to reflect changes in the program resulting from budgetary actions, and the Intelligence Group Technical Interface Design Plan was completed. Responsibility for development of joint message standards for the Joint Tactical Information Distribution System (JTIDS) was added to the program. In 1977, the Ground and Amphibious Military Operations program was reorganized into the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program in response to Congressional direction. The Joint Interface Test Force (JITF) staff was expanded by the Service/Agencies and an initial procurement of equipment was initiated for Intelligence Interface Testing. All program documentation has been revised to reflect reorganization of the program. Work has begun on the revision of Program Memorandum No. 99 to reflect program and fiscal changes. Preparation of test plans for Joint Intelligence Testing began, plans for the provision of engineering support for the JITF have been made, and technical interface design plans for the other functional groups have been started. The development of message standards for the JTIDS was continued.

2. FY 1979 Program: The JITC will be activated, testing hardware and communications equipment will be delivered and installed, joint test plans will be completed, and joint preliminary testing of the Intelligence Group will start. The JITC system design plan and the Test Proposal will be completed, plans for testing of the Air Operations Group will be initiated, initial test results of the Intelligence Group will be evaluated, and configuration management of developmental standards will start. In addition, a plan for transition of Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) functions into JINTACCS will be completed and documents will be revised such as the Management Plan, JINTACCS Main Elements Dictionary, and the JITF organizational plan. JINTACCS will also provide a technical capability for addressing and coordinating US/North Atlantic Treaty Organization (NATO) interoperability requirements for tactical command and control systems. Increase in funding over the FY 1978 level is due to the activation of the JITC and the delivery and installation of communications equipment.

3. FY 1980 Planned Program: Preparation and refinement of Technical Interface Design Standards, Joint Interface Test Plans, engineering studies, and configuration management plans will continue. Operation of the JINTACCS Systems Engineering Office, the Joint Service/Agency Support Office, the Joint Interface Test Force, joint technical working groups, and other joint organizations

will continue. Planning and development to insure compatibility between US/North Atlantic Treaty Organization (NATO) systems will continue. Increase in funding over the FY 1979 level is due to the transition of the remaining Tactical Air Control Systems/ Tactical Air Defense Systems (TACS/TADS) program functions into the JINTACCS program, the acquisition of additional equipment, and increased level of testing.

4. FY 1981 Planned Program: The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) program responsibilities and remainder of the workload will be assumed by the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program in FY 1981. Air operations testing is scheduled to begin in January 1981 and will continue throughout the year. An Operational Effectiveness Demonstration (OED) for intelligence systems is scheduled for May 1981 as part of a joint Service exercise under Commander-in-Chief, Atlantic. Data base and program documentation will continue to be updated.

5. Program to Completion: This is a continuing program.

6. Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Begin compatibility and inter-operability testing intelligence segment	July 1979	June 1979
Begin compatibility and inter-operability testing air operations segment	January 1981	October 1980
Begin compatibility and inter-operability testing operations control segment	January 1982	Now shown in FY 1979
Begin compatibility and inter-operability testing amphibious/ fire support segment	July 1983	June 1983

Project: #D310 Title: Joint Interoperability of Tactical Command and Control Systems (Executive Agent)

Program Element: #6.47.79.A Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration Budget Activity: #4 - Tactical Programs

Current milestone dates differ from those shown in the FY 1979 submission due to the fact that additional time was required to allow for the development of methodology to be used in the consideration of North Atlantic Treaty Organization (NATO) requirements.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2900	7200	12192	14181	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	2900	7200	12192	-	Continuing	Not Applicable
Quantities (current requirements)						Not Applicable
Quantities (as shown in FY 1979 submission)						-

There are no differences in funding profiles between the FY 1980 and the FY 1979 Congressional Descriptive Summaries for this project.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.10.A
DOD Mission Area: #449 - Chemical-Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Cont act Point and Test
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	569	781	824	1039	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D049	Joint Chemical/Biological Contact Point and Test	569	781	824	1039	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Potential adversaries (USSR and Warsaw Pact) have significant chemical-biological (CB) equipment and practice CB offensive and defensive procedures to develop proficiency for operating in a CB environment. US forces also must be able to survive in a chemical environment and accomplish their mission. To do this, they need to develop a variety of CB equipment and procedures. The Department of Defense (DOD) directed the Army to establish a Research, Development, Test and Evaluation (RDTE) program to support Unified Commander and Services' identified needs for CB equipment and procedures testing in support of their operations. This program allows commanders of US forces to test nondevelopmental equipment conduct appropriate supporting studies, and adopt operating procedures to provide quick solutions to some of its CB needs while awaiting the results of longer term research and development efforts. This data also support development of CB requirement documents and tactical doctrine by users. Dugway Proving Ground (DPG) is the only DOD facility possessing the specialized personnel, equipment, and facilities (including real estate) to provide the broadrange of CB tests and studies support necessary to satisfy the stated user needs. This program covers direct costs incurred by DPG in supporting operational tests, investigations and/or studies for Unified Commanders and Services; provides for the publication and maintenance of CB technical data sSource books; and supports accomplishments of the Army's Executive Agency responsibilities in RDTE support of development of chemical weapons and chemical and biological defense (CW/CBD) for the Services.

C. BASIS FOR FY 1980 RDTE REQUEST: To meet the Unified Commanders and Services requirements, several operations research studies and tests on CB matters will be in progress and/or completed. They will include: chemical agent simulant tests and selection; tests of aircraft operations in a toxic environment; and tests of operational decontamination methods. Residual biological effects in a variety of environments and the residual hazard from chemical and biological agents will be investigated. CB technical data source books will also be published and distributed.

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	569	781	778	Continuing	Not Applicable

There is essentially no difference between the FY 1980 and FY 1979 funding for Congressional Descriptive Summaries for this program element. Level of effort remains comparable for each fiscal year.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are to plan, conduct, evaluate, and report on joint tests and/or operational research studies in response to requirements from the Unified Commanders and the Services and to serve as the Department of Defense joint contact point for all CB defense test and CB technical data source books. Tests and studies will provide essential nondevelopmental data on chemical weapon systems and chemical/biological defense materiel, and will determine whether tested items and/or systems meet the military technical characteristics required by the user. Joint contact point accomplishes the publication and maintenance of CB technical data source books and provides data evaluation studies in support of CB data inquiries.

G. RELATED ACTIVITIES: The Department of the Army (DA), as the DOD Executive Agent for research, exploratory development, and advanced development for CW/CBD systems, is responsible for joint operational tests, investigations and/or studies for Unified Commanders and the Services. Work is coordinated through a joint coordinating group composed of representatives of all Services. Coordination and cooperation is also maintained with the United Kingdom, Canada, and Australia through the Quadripartite Working Group (QWG), The Technical Cooperation Program (TTCP), and with the North Atlantic Treaty Organization (NATO).

H. WORK PERFORMED BY: In-house efforts are conducted at Dugway Proving Ground, UT. No contract work is performed in this program.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: This program started in FY76. During FY76 four final reports on field test programs and five CB technical source books were completed and published. Two test programs and one operations research study were conducted in support of the development of improved chemical and biological defense materiel and procedures. During FY77 two final reports on field test programs, five studies and five CB technical data source books were completed and published. Tests and studies provided essential data on chemical weapon systems and chemical/biological defense materiel to determine whether items and/or systems met the military technical characteristics required by the user.

2. FY 1979 Program: Seven operations research tests, three operations research studies and two CB technical data source books will be in progress and/or completed in FY79. The output of the tests, studies and source books is knowledge leading toward improvements in CB defense and assurance that development equipment meets requirements.

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: Seven operations research tasts, five operations research studies and one CB technical data source book will be in progress and/or completed in FY80. The basic output of the tests, studies, and source books is knowledge leading toward improvements in CB defense of US Forces and assurance that development equipment meets requirements. The funding level will support the test/study requirement and will retain the in-house capability and state-of-the-art knowledge essential for evaluation of chemical weapons and CB defensive systems requirements received from the Unified Commanders and Services.

4. FY 1981 Planned Program: Five operations research tests, two operations research studies and one CB technical data source bBook, in support of the development of improved CB defense materiel and procedures, will be in progress and/or completed in FY80.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.13.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Battlefield Systems Integration
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3583	3000	3300	5300	Continuing	Not Applicable
DF26	Battlefield Systems Integration	3583	3000	3300	5300	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides funding for creative, interdisciplinary design work which treats the Army in the field as a total cohesive system with each subsystem (e.g., armored forces, intelligence, artillery) configured to maximize the full combat capability of the force. The analysis and action process of integration of the battlefield system, when fully developed will provide a credible, orderly procedure, whereby trade-offs can be quantified between near-term improvements (product improvement programs (PIP), changes in doctrine, organizations) and long term modernization, such as major modifications to existing systems or definition of new weapons/systems. The Army's readiness to fight the battle is materially enhanced by facilitating the development of the most effective total system.

C. BASIS FOR FY 1980 RDTE REQUEST: Continue in-house and contractual effort to refine the Battlefield systems integration data base and verify that it reflects the Army combat system architecture. Consider and define systems gaps and overlaps and recommend program adjustments based on validated concepts to effect integration on the battlefield.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	3951	7000	6000	Continuing	Not Applicable

Differences in FY 1980 and FY 1979 profiles are a result of reprograming for higher priority requirements in FY 1978, a congressional reduction in FY 1979 and transfer of funds to higher priority programs for FY 1980.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.13.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Battlefield Systems Integration
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The Commander, USA Materiel Development and Readiness Command (DARCOM), formed the Directorate for Battlefield Systems Integration (DBSI) to identify new research and development initiatives that will produce the highest payoff in combat capability. The DBSI formulates broad mission area objectives and plans which take into account existing guidelines in the effort to identify and close gaps in Army battlefield capabilities, provide guidance in the formative stages of systems development, eliminate duplication in materiel acquisition programs, improve the bridge between technological opportunities and operational requirements, promote the interoperability of existing and planned capabilities within the Army and with the other Services, and insure that weapons systems development is synchronized and consistent with doctrinal concepts developed by the US Army Training and Doctrine Command (TRADOC). The DBSI also identifies new materiel needs and recommends the initiation of materiel development programs to fill these needs, and recommends the revision, or termination of those programs that do not promise sufficient contributions to the overall systems capability.

G. RELATED ACTIVITIES: DBSI is not duplicative of any other organization within DoD. Some exploratory work involving analysis of existing capabilities in the areas of communications links, data processing, and response transmission was accomplished in FY 1976 under contractual effort funded in Program Element 6.37.23.A, Command and Control. Related background studies involving functional description of combat subsystems were accomplished by the US Army Materiel Systems Analysis Agency (AMSAA), also in FY 1976. DBSI maintains close coordination with the other Services to develop solutions to problems of overlapping interest or responsibilities.

H. WORK PERFORMED BY: MITRE Corporation, (Federal Contract Research Center), McLean, VA, programed for $1700K in FY 1980. Other contracts (contractors as yet undertermined) are planned but have not yet been awarded. In-house work is performed by the US Army Materiels and Mechanics Research Center (AMMRC) in Watertown, MA; AMSAA in Aberdeen, MD; and DARCOM labs.

I. PROGRAM ACCOMPLSIHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Reviews and analyses were accomplished in the areas of Target Acquisition, Communication, Command and Control (C^3), Weapon Engagement, Aviation, Tactical Nuclear, Close Combat Systems, Intelligence, Surveillance, Command Systems, Air Defense, Fire Support, Electronic Warfare (EW), US Army Operations in the Soviet EW Environment and Corps Echelon Integration and Experimentation and Zone II Interdiction. As a result of these reviews and analyses, mission areas and functional groups of systems have been defined and approved by Headquarters, Department of Army. On a quarterly basis, the DARCOM Technology Base Projects are examined in relationship to prioritorized requirements for system capabilities and published in a SPIDER chart. This Systematic Planning for the Integration of Defense Engineering and Research (SPIDER) charting technique provides a catalogue, at the work unit level, of the technology base related to Army Mission Areas and Functional Groups of Systems by specific capabilities, and provides the basis for continuous data exchange between TRADOC schools and DARCOM laboratories. Data experimentation was conducted and workshops presented which demonstrated graphics and software capabilities to achieve tactical real-time integration of intelligence operations information for combat command decisions. A functional specification, for the system concept demonstrated, was developed. Published the electronic Warfare systems handbook, a comprehensive

compendium of DoD present and planned electronic warfare (EW) and surveillance system capabilities and characteristics to assist field operating personnel in the planning and execution of integrated military operations. A model evaluation methodology was developed that will allow the Directorate for Battlefield Systems Integration (DBSI) to estimate the worth of numerous materiel solutions to battlefield system deficiences identified in system area investigations.

2. FY 1979 Program: A prototype Army battlefield system data base will be developed and several functional areas (Fire Support; Air Defense Artillery; Intelligence; Surveillance and Target Acquisition) will be reviewed to insure they accurately represent the Army battlefield systems architecture. Methodologies for applying the prototype data base in these functional areas and a final design for the Army battlefield system data base will be developed. Subsystems integration, including Fire Support, Antiarmor, Chemical, and Division Air Defense Systems, will be analyzed. Analysis and demonstration will be conducted of an automated process of correlating the voluminous intelligence information needed to prepare an intelligence estimate prior to any combat operation (Intelligence Preparation of the Battlefield - IPB). This effort will demonstrate automating rudimentary elements of what is presently a wholly manual process which is non-responsive to the speed of modern warfare.

3. FY 1980 Planned Program: Battlefield integration will accomplish the following efforts: (a) Complete the chemical/biological subarchitecture and address ability of theatre forces to operate in a chemical environment; (b) Analyze current and future fire support systems to determine their relative effectiveness and identify necessary adjustments to communication and data interchange systems; (c) Analyze cargo helicopter requirements; (d) Identify expendable electronic warfare devices; (e) Complete IPB experimentation and demonstrate an approach to the automation of all aspects and elements of the IPB process; and (f) Complete development of the Army battlefield data base in all functional areas and verify accuracy of representation for various target years. New starts in FY 1980 are: (a) Evaluation of adequacy of acquisition sensors available to division air defense artillery; (b) Analysis of tactical ballistic missile defense; (c) Conduct of data systems interoperability engineering studies; (d) Determination of logistics supportability of battlefield systems; (e) Research on reduction of firing signature of infantry and armor weapons; (f) Development of a technique to quantitatively measure the value of barriers and counter barrier efforts on the central battle; and (g) Assess the relative survivability of US/NATO and USSR/WP nuclear delivery systems in support of the TRADOC TNF/S program.

4. FY 1981 Planned Program: Establish interface between subsystem architectures and Technology Base. Introduce obscurant effects explicitly into all systems architectures. Identify Soviet/Warsaw Pact weaknesses which impair their ability in the central battle. Evaluate Corps and Subordinate Echelon (CASE) Command and Control System. SPIDER chart Foreign Technology Base. Conduct field experimentations designed to test the comparability between the functional subsystems and the Army combat architecture in the field, as well as on-site application of IPB.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1014	17200	26200	17700	0	196084
	QUANTITIES						857
D336	Heavy Antitank/Assault Weapon System (TOW)	1014	17200	26200	17700	0	196084

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The TOW (tube-launched, optically tracked, wire-command link guided missile system) is the principle close combat, direct fire, heavy antitank/assault weapon used by Infantry and other units to defeat heavily armored vehicles and fortifications. It can be employed on a ground mount, is crew-portable, and is mounted on a variety of military vehicles including the helicopter. However, the TOW system has major deficiencies in warhead and guidance in the current battlefield environment.

C. BASIS FOR FY 1980 RDTE REQUEST:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Improved Warhead Flight Test	2QFY80	Not Applicable

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	544	3500	993	0	135892

The increase in FY 1978 funds is due to the initiation of the RDTE efforts. Additional funds are required in FY 1979 through FY 1981 to complete the development effort for a
The FY 1979 $17.2 million requested includes $13.7 million of the FY 1979 supplemental request. Total estimated cost increased due to the retrofit development effort.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Missile Procurement, Army (MIPA)						
Funds (current requirements)	40900	42251	58200*	61400	3000	1221500
Funds (as shown in FY 1979 submission)	42900	42251	0		3000	917500
Quantities						
Launchers (current requirements)	189	0	0	-	0	6363
Missiles (current requirements)	5720	9600	12865	12735	0	169870
Launchers (as shown in FY 1979 submission)	189	0	0			6363
Missiles (as shown in FY 1979 submission)	5720	6000	0			140670

The increase in funds for FY 1980 and FY 1981 is due to the increased authorization objective and the outyear deployments of additional TOW launchers.

* A portion of the FY 1980 procurement funds may be used to produce This action could reduce the number of missiles procured.

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The TOW (tube-launched, optically tracked, wire-command link guided missile system) is integral to the family of antitank weapons and was designed to defeat armored vehicles out to ranges of 3,000 meters. TOW provides a heavy antitank/assault capability for the infantry, airborne infantry, airmobile, and mechanized infantry battalions. It is crew-portable and can be employed on the ground or mounted on a variety of military vehicles. The missile can be fired from helicopters when the necessary airborne control equipment is provided. The missile is tracked in flight by an infrared sensor at the launcher and automatically guided by electronic commands transmitted over a wire link to the missile. The gunner has only to keep the crosshairs of the optical sight on the target until missile impact.

G. RELATED ACTIVITIES: The TOW night sight was the pilot program for developing common components for man-portable night vision devices. Components developed for the TOW night sight are also used in such systems as the Medium Antitank Assault Weapon (DRAGON) Night Tracker (Program Element (PE) 2.37.27), the Night Observation Device Long Range (NODLR), (PE 6.47.10 Night Vision Devices) and the Ground Laser Locator Designator (GLLD) (PE 6.43.08 Precision Laser Designators). A TOW Cover Artillery Protection (TOWCAP) was completed as a quick fix using a ballistic blanket to provide protection for TOW crews against artillery fire. Modifications to the M113A1 armored personnel carrier are under development to provide a TOW vehicle with crew protection (Improved TOW Vehicle) (PE 6.36.26.A). In addition, the TOW System is being mounted on the COBRA helicopter (PE 6.42.12) and the Fighting Vehicle Systems (PE 6.46.16 and 6.46.29).

H. WORK PERFORMED BY: The major contractors are Hughes Aircraft Company, Culver City, CA; Emerson Electric Company, St. Louis, MO; and Texas Instruments, Incorporated, Dallas, TX. Army management of the TOW Weapon System is performed by the TOW/DRAGON Project Manager, US Army Missile Readiness Command, Huntsville, AL.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

1. FY 1978 and Prior Accomplishments: The basic weapon system development was completed. The TOW Manportable Common Thermal Night Sight (MCTNS) completed advanced development and entered engineering development (ED). Nine night sights were fabricated for Research and Development Acceptance Testing (RDAT) conducted in March 1975. A competition for the night sight ED between Texas Instruments (TI) and Hughes Aircraft Company was won by TI. The ED models of the TOW TNS started Developmental Testing (DT) at White Sands Missile Range in FY 1976 and Operational Tests (OT) in Europe in FY 1977. In FY 1977 the TOW MCTNS completed DT/OT II, was type classified standard and the first production contract was awarded. A solid state track link (SSTL) development program was completed in FY 1977 to provide TOW (tube-launched, optically tracked, wire-command) with a low susceptibility to electronic countermeasures (ECM). The SSTL program was terminated in FY 1977 when it was determined that the SSTL beacon-tracker data link

2. FY 1979 Program: Complete thermal night sight Engineering Development (ED) with major emphasis on correction of deficiencies.

3. FY 1980 Planned Program:

4. FY 1981 Planned Program:

5. Program to Completion: Approximately 60000 missiles and all launchers are planned to be modified; however, this program will be reviewed continually depending upon the progress of the ATGM (Antitank Guided Munitions) Improvements effort.

J. Test and Evaluation Data:

1. Development Test and Evaluation:

a. Development of the TOW Missile System was initated in October 1963. The prime contractor for TOW is Hughes Aircraft Company (HAC).

b. Development Test I (DT I) (Engineer Design Tests) started in August 1963 and were completed in March 1967. In addition to contractor tests, tests were conducted by Army Missile Command and Army Electronic Command at Huntsville, AL. Major deficiencies with the missile case and missile light sources were discovered during this testing.

c. DT II (Engineer Test/Service Test) was conducted from December 1966 to July 1969 by Test and Evaluation Command (TECOM) at White Sands Missile Range, NM; Fort Benning, GA; and Fort Greely, AK. The major deficiencies with the missile case and light source discovered during DT I had been corrected and no further major deficiencies were discovered.

d. DT III (Initial Production Test) was conducted from November 1969 to May 1970 by the US Army Test and Evaluation Command (TECOM). This test verified that the hand tooled production items met production specifications and had the same characteristics as the prototypes.

e. A night sight program was initiated in 1968 to provide the TOW weapon system with a night fighting capability without the use of artificial illumination. A pulse gated, laser aided sight was developed and tested. The maximum range of this sight varied from meters depending on the amount of ambient light. The rapid improvement in far infrared technology resulted in termination of the pulse gated night sight program. In March 1972, a program was initiated to develop a TOW thermal night sight that will enable detection of targets out to the full meter range of the system. Prototypes from three contractors were evaluated during Developmental Test I (DT I) from December 1972 - May 1973 by the US Army Electronics Command at both the Night Vision Laboratory (NVL), Fort Belvoir, VA, and US Army Missile Command facilities, Huntsville, AL. Prototypes from two contractors, Hughes Aircraft Company and Texas Instruments (TI), entered final competition. Government tests included Laboratory Performance Tests at NVL from 18 Feb to 27 Jun 1975, Firing Tests at Redstone Arsenal from 3-22 Mar 1975, Acquisition Tests at Camp A.P. Hill, VA, from 2 Apr to 19 May 1975, and other systems and handling tests held at Redstone Arsenal, AL, and Fort Benning, GA. Results of Acquisition Tests during clear weather were Detection, meters, and Recognition, meters. Firing results are included in paragraph g. The TI sight won the competition and continues in Engineering Development. DT II was conducted primarily at White Sands Missile Range (WSMR) by TECOM during the period from June 1976 through February 1977. A deficiency in boresighting was discovered. A new boresight collimator was used in Operational Test II (OT II), Phase II, which proviede a significant reduction in time required

to boresight. The new collimator was evaluated in the Improved Tow Vehicle (ITV) Operational Test III (OT III) and Ground Laser Locator Designator (GLLD) OT II. Further evaluation with ITV will be accomplished during the ITV follow-on evaluation in 3QFY1979. Development Test III (DT III) was determined by Department of the Army to be unnecessary and was not conducted. The AN/TAS 4 night sight was type classified standard A in September 1977.

f. Research was conducted by Hughes Aircraft Company (HAC) from FY 1965 through FY 1971 to provide for the TOW system. In FY 1971 Texas Instruments (TI) proposed a for TOW. Development Test I (DT I) tests were successfully conducted in July 1972 using a SSTL launcher and three missiles. An engineering development (ED) contract competition followed with a contract awarded to TI in May 1974. In 1975, four SSTL breadboard and five SSTL prototype missile firings were conducted at 3000 meters from launchers. Four of the missiles were since the launcher must be capable of firing the missile. were successful. During March to July 1976 the contractor adjusted the missile flight data link against jammers. A Combined DT/OT II was started in March 1977 at White Sands Missile Range with United States Army Infantry Board (USAIB) as the test organization. The test was suspended in April 1977 because of missile beacon failures. The contrator redesigned the missile beacon which performed reliably in subsequent tests. With the addition of the night sight to the TOW system, it was determined that the
The SSTL program was terminated by the Army in September 1977. A decision was made to pursue guidance changes that would provide

g. A tabulation of TOW missile test firings follows:

Summary of Test Firings

Test Program	Dates	Launches 1/	Functional 2/	Hit (1)	No Test (2)	No Test (3)	No Test (4)
Contractor Prototype Test	Before July 1966						
Service Test Missiles	Jul 1966-Mar 1967						
Engineering Test/Service Test Prior to Aug 67	Apr 1967-Aug 1967						
Environmental Test							
Tropic	Aug 1970-Sep 1971						
Arctic	Nov 1970-Feb 1971						
Desert	Jun 1970-Nov 1970						
Research Development Acquisition Tests/Operational Test Ia (RDAT/OT Ia)							
TOW (AN/TAS-4) Night Sight (Stationary & Moving Targets)	3-22 Mar 1975						3/
OT II - TOW Night Sight	Oct-Nov 1976						4/
SSTL Breadboard Firing*	Feb-Mar 1975						
SSTL Prototype Firing*	Jul-Oct 1975						

* Misses due to Beacon failures.
1/ Total number of recorded missile launches during the test.
2/ Number of recorded missile launches minus reliability failures.
3/ , missed due to "canned" launch shift, missed due to noise in launcher electronics. No misses were due to the night sights.
4/ hit an obstruction in front of target and hit wrong target.

NOTES:

1. Hits are scored on 7.5 x 7.5 ft. stationary targets and 7.5 x 7.5 ft. moving targets.
2. No test was indicated when missiles were fired outside range or environmental requirements.
3. No test due to gunner error,
4. No test due to other causes.

2. Operational Test and Evaluation:

a. The Confirmatory Troop Test was conducted from July to September 1970 at Camp Roberts, CA, by the US Army Combat Developments Command (CDC) using a trained TOW platoon under simulated tactical conditions. Objectives of the test included an evaluation of the TOW system when operated by typical user troops in a simulated battlefield situation and a comparison of the TOW with the 106mm Recoilless Rifle. The TOW missile system out-performed the 106mm Recoilless Rifle in all tests and performed well under simulated tactical conditions.

b. The TOW weapon system was accepted for service use (Type Classified Standard A) in September 1970 and the first tactical units were equipped in Europe in October 1970. Issue of launchers to USAREUR based forces was completed in February 1976. Issue to US forces in Korea has been completed and distribution initiated to Continental United States Forces. With approximately production missile firings, the weapons system is performing well. The system was deployed to US Forces in Vietnam in May 1972 and was a highly successful weapon system in combat. Based on operational requirements, a major modification to the TOW system was the addition of a thermal night sight.

c. The TOW night sight was incorporated into the manportable common thermal night sights (MCTNS) Program and underwent operational testing (OT II) in Europe which was completed Nov 1976. The TOW night sight portion of MCTNS OT II was conducted with preproduction prototype items by the Operational Test and Evaluation Agency (OTEA), using one mechanized infantry company team provided by USAREUR. The test revealed reliability deficiencies within the cryogenic system and difficulties in boresighting. Design modifications were made and tested in MCTNS OT II, Phase II, during the period 7 through 18 March 1977 at White Sands Missile Range. Test results indicated that the new collimator allowed significantly faster boresighting with improved repeatibility. There were no cryogenic failures in 124 hours of operating time. OT III was determined by Department of the Army to be unnecessary and will not be conducted.

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon (TOW)
Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Range		
Minimum	65M	65M
Maximum	2000M	3000M
With Night Sight		2/ 5/
Probability of a Kill given a Hit		3/
System Reliability		4/
Probability of a Hit given a Reliable		
Round-Stationary Targets		
Moving Targets		
Using Night Sights against Stationary Targets		5/

1/ Developmental and Operational Firings.
2/ Sight is in Engineering Development Stage.
3/ Analytical Data.
4/ TOW's Probability of Hit given a Reliable System is higher than predicted. Overall mission accomplishment or probability of a first hit is computed by multiplying probability of hit given a reliable system by system reliability. Overall mission accomplishment is higher than the requirement and therefore the Army accepts the demonstrated reliability.
5/ Hitting performance during the combined Research Development Acquisition Tests (RDAT)/Operational Test Ia, with user troops, was

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4200	100	6052	0	6000	96352
	QUANTITIES						
	Fire Units						5
	Missiles						163
D697	CHAPARRAL	4200	100	6052	0	6000	96352

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development of missiles, ground support equipment, and system improvements for the CHAPARRAL air defense missile system, and for improvements to the Forward Area Alerting Radar (FAAR) System. The CHAPARRAL Air Defense Missile System provides low altitude, fair weather air defense for Infantry/Mechanized Infantry/Armor Divisions and key Corps rear area activities and installations. The FAAR provides alert warning information for CHAPARRAL as well as for the REDEYE and VULCAN Forward Area Air Defense Systems.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds are requested to initiate a Product Improvement effort to provide the CHAPARRAL with the capability of engaging targets at night. The effort involves the design, development, and fabrication of a modular Forward Looking Infrared (FLIR) subsystem for incorporation on the CHAPARRAL fire unit (ground support equipment). This improvement will effectively double the time the current system is capable of operating.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
CHAPARRAL RDTE Program Initiated	February 1965	February 1965

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

Initial Operational Capability	November 1969	November 1969
System Type Classified Standard	November 1970	November 1970
Improved CHAPARRAL Missile (less smokeless motor) Type classified standard	November 1974	November 1974
Initiated Identification, Friend or Foe (IFF) Development	July 1975	None
Initiated Smokeless Motor Development	November 1975	November 1975
IFF Approved for Production	September 1977	None
Smokeless Motor Approved for Production	June 1978	2QFY1979
Initial Operational Capability (IOC) for Improved CHAPARRAL Missile (less Smokeless Motor)		None
IOC Smokeless Motor		None
IOC Identification Friend or Foe		None
IOC Night Capability Product Improvement		None

The change in the milestone concerning smokeless motor production results from

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4229	100	0	0	84300

Increase in Total Estimated Cost results from a FY 1980 new start to provide the system with a night firing capability.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)	33345	34700	3200	3200	10000	464600
Funds (as shown in FY 1979 submission)	30000	31800	3100	3100	6400	457400
Quantities (current requirements)						
Missiles	870	850	0	0	0	13320
Fire Units	0	0	0	0	0	500
Quantities (as shown in FY 1979 submission)						
Missiles	850	850	0	0	0	13300
Fire Units	0	0	0	0	0	500

Increase in FY 1978 results from: (1) increased missile unit cost which was caused by spreading the buy over two years rather than buying them all in one year as the original estimate reflected; (2) inclusion of smokeless rocket motors in the missile buy; and (3) addition of payback missiles to replace older missiles sold from stock to Taiwan. Increase in FY 1979 results from the addition of 600 replacement smokeless rocket motors per Congressional guidance. Increases in FY 1980 and beyond result from the application of new DOD inflation indices.

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: In November 1964, the Secretary of Defense directed the initiation of a development program for an interim air defense system to provide low altitude, fair weather, air defense protection in the forward area of the theater army. Existing missile systems such as HAWK were too large and expensive to provide the mobility and proliferation required to counter modern fighter aircraft using very low altitude attack techniques. A combination missile/gun defense was determined to be the optimum means of meeting the requirement. The CHAPPARAL AND VULCAN air defense systems were developed and fielded as composite battalions. CHAPARRAL/VULCAN battalions are currently authorized in all US Army divisions, except airborne and air assault, which only have VULCAN. Additional nondivisional battalions have the mission of protecting selected targets in the Corps rear areas, such as airfields and other vital installations. The CHAPARRAL system consists of the MIM-72A Basic or MIM-72C Improved CHAPARRAL missile (derivative of the Navy Sidewinder 1C Air-to-Air missile), the M54 guided missile launching station, the M730 tracked vehicle carrier and appropriate communications, maintenance, and test equipment. The MIM-72A Basic Missile, originally fielded with the CHAPARRAL system, has several recognized limitations including a tail chase only engagement capability, The MIM-72C Improved CHAPARRAL Missile was developed to alleviate those limitations. The significant improvements incorporated by the MIM-72C are the AN/DAW-1 Guidance Section, Directional Doppler (DIDO) Fuze, and Blast Fragmentation Warhead. A Smokeless Missile Motor, which may be utilized with either the basic or improved missile versions, is being developed. The AN/DAW-1 Guidance Section provides an all aspect forward hemisphere firing capability, increases the system's close-in engagement capability, has improved producibility and improves the system's performance against such The DIDO Fuze has much increased and coupled with the new warhead, provides increased lethality for the missile. The Smokeless Missile Motor, reduces the system's battlefield signature and reduces gunner reaction time for succeeding engagements. The M54 Launching Station is a movable turret with supporting base structure which provides the gunner with full capability for aiming and firing the missiles. The M730 fully-tracked vehicle transports the five-man crew, launching station and basic load of 12 CHAPARRAL missiles. The system currently relies on visual target identification; however, development is complete on the Mark XII, Crypto-Secure Identification Friend or Foe (IFF) set for the system and procurement of kits is planned to begin in FY 1979. The Forward Area Alerting Radar (FAAR) is a lightweight, highly mobile radar which provides alerting and tentative identification data on aircraft to ranges of A FAAR platoon consisting of eight radars is authorized for divisional CHAPARRAL/VULCAN battalions. Nondivisional FAAR platoons have six radars. Alerting data are received on portable target alerting data display sets (TADDS) authorized for CHAPARRAL/VULCAN fire units and REDEYE teams. (REDEYE is the Army's current short range, man-portable, shoulder fired air defense missile system. It is designed to move with the troops and provide continuous and immediately responsive air defense).

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

G. RELATED ACTIVITIES: VULCAN (Program Element 2.37.32.A), ROLAND (Program Element 6.43.09.A) and STINGER (Program Element 6.43.06.A) are complementary programs. Duplication of effort is avoided by continuous CHAPARRAL project office coordination with the Naval Weapons Center, China Lake, CA, developer of the Sidewinder 1C, the US Army Missile Research and Development Command Laboratories, which maintain cognizance of Army and other service programs, and through continuous coordination with other project offices.

H. WORK PERFORMED BY: The CHAPARRAL ground support equipment is contracted by the US Army Missile Materiel Readiness Command, Huntsville, AL, to Ford Aerospace and Communications Corporation (formerly Aeronutronic Ford), Newport Beach, CA. The basic CHAPARRAL missile (MIM-72A), less guidance section, was procured by Military Interdepartmental Procurement Request (MIPR) through the Navy. The guidance section was contracted to Raytheon, Bedford, MA. The Improved CHAPARRAL Missile (MIM-72C) is contracted by the US Army Missile Materiel Readiness Command to Ford Aerospace. The contractor for the CHAPARRAL carrier, M730, which is provided as government furnished equipment to Ford Aerospace, is Food Machinery Corporation (FMC), San Jose, CA. The Forward Area Alerting Radar (FAAR) was contracted to Sanders Associates, Incorporated, Bedford, MA, for the first procurement and to Sperry, Gyroscope Division, Great Neck, NY, for the second procurement.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: CHAPARRAL development began in February 1965. The first tactical CHAPARRAL unit was deployed in November 1969 and the system was type classified Standard in November 1970. The Improved Missile was type classified Standard November 1974. A program to develop a prototype target acquisition aid (TAA) to permit the system to engage targets at night was completed in December 1974. TAA was not adopted because of complexity and cost. However, a new developmental effort to give the system a night engagement capability is to begin in FY 1980 based upon the use of the modular forward looking infrared (FLIR) device, which should be less costly, less complex and more effective than the earlier TAA. The AN/DAW-1 Guidance Section as originally designed was and an in-depth study of the problem was made in 1974. In 1975 the US Army Missile Research and Development Command (MIRADCOM) conceived and evaluated a fix (later to be designated "GOLDEN I") which promised to provide the improved missile with a significant capability both quicker and cheaper than the techniques identified in the study. MIRADCOM, in conjunction with the contractor, validated and finalized the "GOLDEN I" design. Firings confirmed that the "GOLDEN I" fix provided the CHAPARRAL with a throughout much of the launch boundary. A development effort to optimize the "GOLDEN I" fix was initiated in April 1976. Additional firings conducted in connection with this effort were successful and confirmed predictions of improved performance over "GOLDEN I". Improved CHAPARRAL missiles incorporating optimized "GOLDEN" were fielded in 1QFY1979. An Identification Friend or Foe (IFF) Development program began in July 1975. The development concept called for integration of the IFF interrogator and

programmer developed for STINGER (replacement of REDEYE), with an antenna, electronic controls and interconnections developed especially for the CHAPARRAL fire unit. The identification Friend or Foe (IFF) was type classified standard and approved for production in September 1977. Procurement is planned to begin in FY 1979. The smokeless motor development effort was initiated in November 1975 and production is expected to begin this year. During the FY 1977 budget hearings the Army was directed by Congress to initiate an adverse weather CHAPARRAL demonstration program to provide a hedge against ROLAND technical and funding problems. The program was completed on schedule in July 1978. Work commenced on the Forward Area Alerting Radar (FAAR) in May 1966. The FAAR was initially approved for Limited Production (LP) in October 1968. Approval for LP was rescinded in March 1969 because of equipment deficiencies. Following modification and test, the system was returned to LP status, and approved for full production in April 1971.

2. FY 1979 Program: Final development tasks for the smokeless rocket motor will be completed. These include review and approval of the contractor's final technical report; review and analysis of the government's final test report and corrective action on problems noted; review and analysis of the final technical data package for completeness and accuracy.

3. FY 1980 Planned Program: The FY 1980 program will focus on the development of a night firing capability for the CHAPARRAL system. The current system is limited by the ability of the gunner to visually detect the target. This limitation is to be alleviated by the addition of a forward looking infrared (FLIR) thermal imaging subsystem on the CHAPARRAL fire unit which will effectively double the time the current system can operate. Proposal(s) will be evaluated and a contract awarded for full scale development of the night firing capability. Design, development, and documentation of the FLIR subsystem, consisting of optics, infrared sensors and imaging unit, controls, visual target display, autotrack circuit and system interfaces will be initiated. Necessary changes to the system's test equipment and special acceptance inspection equipment (SAIE) will be identified and the required design, development and documentation of these changes initiated. Fabrication, assembly and integration will be initiated for six prototype FLIR subsystems, six modification kits for the system's field test equipment and one modification kit for the SAIE. Contractor tests will be started. The logistics support and reliability and maintainability plans will be prepared. Production Engineering Planning (PEP) to include facilities, tooling and test equipment will be initiated. The plan for government test will be prepared. All necessary experimental work has been performed and the proposed system is ready for full scale development.

4. FY 1981 Planned Program: Not Applicable.

5. Program to Completion: Efforts begun in FY 1980 to provide the system with a night firing capability will be completed. Government testing, to include engineering and operational phases will be completed. These tests will include sufficient aircraft acquisition and tracking missions plus live missile firings to confirm performance of the system under field conditions with troops. Where possible, data from contractor tests will be used to satisfy government test requirements.

J. TEST AND EVALUATION DATA:

1. Development Test and Evaluation:

a. The prime development contractor for CHAPARRAL was Ford Aerospace and Communications Corporation (formerly Aeronutronic Ford), Newport Beach, CA. The US Naval Weapons Center, China Lake, CA, performed redesign, modification, and evaluation of the SIDEWINDER 1C missile for use in the CHAPARRAL program. The system consists of the MIM-72A or MIM-72C CHAPARRAL missile (SIDEWINDER adaptation), the M54 guided missile launching station, the M730 tracked vehicle carrier and appropriate communications, maintenance, and test equipment. The MIM-72A Basic CHAPARRAL missile was originally fielded with the system. Engineering design/military potential testing of the CHAPARRAL system was conducted during the period March 1965 to August 1965. Based on the favorable results of those tests, limited production (LP) type classification was approved in September 1965 for the MIM-72A Basic CHAPARRAL missile and in November 1965 for the ground equipment. Engineering test (ET) and service test (ST) were initiated in May 1967 and the major portions had been completed by March 1969. A portion of an initial production test (IPT) was integrated with ST and completed therewith. The remainder was assigned to the ET agency and completed in January 1970. As a result of ET/ST/IPT the system was found suitable for deployment. Tropic environment tests were conducted from July 1968 to February 1970 and Arctic environment tests were conducted from October 1969 to February 1970. These tests confirmed the system's suitability for world-wide deployment. The CHAPARRAL system was type classified Standard in November 1970.

b. The MIM-72C Improved CHAPARRAL Missile was developed to alleviate limitations in the MIM-72A Basic version. The significant improvements incorporated by the MIM-72C are the AN/DAW-1 Guidance Section, Directional Doppler (DIDO) Fuze and Blast Fragmentation Warhead. Prototype and engineering tests of the MIM-72C, all-aspect Improved CHAPARRAL missile, were conducted from May 1971 through July 1973. firings were successful, of which were contact hits on the target. Development test (DT) II was conducted from November 1973 through December 1974. firings were successful. The missile tested was essentially the same as the one procured, with the exception of the AN/DAW-1 "GOLDEN" modifications discussed below. Reliability, availability, and maintainability characteristics of the Improved missile equaled or exceeded those of the basic missile.

c. The AN/DAW-1 Guidance Section as originally designed was]and a fix designated "GOLDEN I" was developed and tested during the period January to December 1975. This effort culminated with the successful firing of CHAPARRAL missiles incorporating "GOLDEN I" against FIREBEE targets. These firings confirmed that the "GOLDEN I" fix provided the CHAPARRAL with a significant degree of immunity against However, it was found that "GOLDEN I" could be further optimized and in April 1976 a development effort was undertaken for that purpose. additional firings were conducted

in connection with this effort, of which were successful and confirmed predictions of improved performance over "GOLDEN I." The and was in no way connected with the AN/DAW-1 "GOLDEN" fix. Based upon these test results the optimized "GOLDEN" was incorporated into the improved missile through engineering change proposal.

d. An Initial Production Test (equivalent to Development Test III/Operational Test III) for the improved missile was initiated in August 1977 but was suspended in December 1977 due to a printed circuit board conformal coating problem subsequently isolated to the production process. Following correction of this problem, the IPT was resumed in August 1978 and was completed in October 1978. The improved missile was released for field deployment in November 1978. A total of missile firings were attempted during the IPT, of which were completely successful. of the remaining firings were classified as

This problem has been corrected and all missiles being produced have the fix in them. The remaining Production hardware was used in this test.

e. A development effort for a smokeless rocket motor to improve the system's battlefield signature and alleviate the gunner obscuration problem caused by residual smoke was started in November 1975. Testing was done under a Single Integrated Test Program Concept with the Government monitoring contractor tests during the development phase and, where possible, utilizing usable data to satisfy Government test requirements. A Government test phase began in October 1977 with emphasis on safety qualification, performance verification maintainability, and impact on system survivability. The motor has demonstrated during these tests that it meets user requirements

The hardware tested is essentially the same as what will be procured with the exception of any engineering changes needed to correct problems noted.

f. A development program for an electronic Identification Friend or Foe (IFF) subsystem for the CHAPARRAL fire unit was begun in July 1975 to alleviate the problem of visual identification. The interrogator and programmer developed for STINGER was used in the CHAPARRAL IFF development. Testing was again conducted on a single integrated test program basis. The US Army Test and Evaluation Command conducted performance and environmental tests during February-September 1977, and also monitored the qualification tests by the contractor and used some of the data from these tests. The IFF met essential user requirements. Shortcomings were noted in the areas of

The hardware tested was essentially the same as that to be procured. The Identification Friend or Foe (IFF) was approved for production in September 1977 and procurement is planned in FY 1979 (126 kits) and FY 1980 (362 kits).

g. During the FY 1977 Budget Hearings, the Army was directed by Congress to initiate an adverse-weather CHAPARRAL demonstration program to provide a hedge against ROLAND technical and funding problems. The demonstration hardware consisted of the current CHAPARRAL fire unit, the CHAPARRAL missile modified with a radio frequency (RF) section, and the following components from the British RAPIER Blindfire Air Defense System: DN-181 Radar, Television Gathering Unit, and Command Transmitter. The program plan was completed on schedule and within budget in July 1978. A total of adverse-weather CHAPARRAL missiles were fired against target drones in this program,] of which were successful.

h. A development effort to be initiated in FY 1980 will provide the CHAPARRAL fire unit with a Forward Looking Infrared (FLIR) subsystem to permit target engagements at night and under other conditions of reduced visibility. A single integrated test program (equivalent to Development Test II/Operational Test II (DT II/OT II)) and an initial production test (equivalent to DT III/OT III) will be conducted as part of this improvement effort.

i. Engineer Design Tests (EDT) on the Foward Area Alerting Radar (FAAR), which provides CHAPARRAL with alerting data, were conducted during the period April 1967 to October 1968. Type classification Limited Production (LP) was awarded upon completion of EDT. Engineering test (ET) and service test (ST) began in March 1968 and May 1968, respectively. These tests were suspended in March 1969 due to numerous equipment deficiencies. The LP type classification was rescinded as a result. ET and ST resumed in January 1971, following verification that problems previously identified had been corrected. ST was completed in July 1971 and ET in September 1971. The hardware used in these foregoing tests consisted of prototypes, engineering development, and advanced production engineering versions of the items procured. All major components of the system were included in these tests. Initial production tests were conducted from December 1971 through August 1972. The items tested were production hardware. These tests resulted in the FAAR being type classified Standard in February 1973. Additional testing has included a tropic test conducted from June through December 1973 and a special evaluation (SE), Phase I test, conducted at Modern Army Selected Systems Test and Evaluation Review (MASSTER), Fort Hood, TX, in November and December 1973. Again, production hardware was used for these tests. A second production contract for FAAR was let in May 1974 and initial production and first article testing conducted.

2. Operational Test and Evaluation:

a. CHAPARRAL: The US Army Operational Test and Evaluation Agency (OTEA) conducted Operational Test II of the MIM-72C Improved missile in Two phases with troops, a nonfiring phase at Fort Lewis, WA, in February 1974, and a firing phase at Fort Bliss, TX, in March 1974. The firing phase was planned to consist of firings. The first successful and

generated sufficient data to satisfy test objectives. Because of this, further operational testing was not required. An independent evaluation was prepared and submitted by the US Army Operational Test and Evaluation Agency (OTEA). The US Army Air Defense Board, Fort Bliss, TX, conducted operational tests on the Identification Friend or Foe subsystems during the period March-April 1977. No major deficiencies were noted and the item met essential user requirements.

b. Forward Area Alerting Radar (FAAR): Phase II of the FAAR special evaluation was completed by OTEA at Fort Lewis, WA. during February 1974. OTEA concluded that the FAAR essentially performs the mission for which it was designed.

The results of the OTEA evaluation were briefed to the Director, Defense Research and Engineering on 5 April 1974. Based on this action, the second procurement of FAAR was approved.

3. Systems Characteristics:

a. CHAPARRAL:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Mobility and Transportability	Self-propelled 100 percent mobile; capable of travel over rough terrain; transportable by rail, Phase II air operations, highway, and ship; move from beached craft to shore under own power; transport by helicopter.	Met
Period of Operation	Continuous for 18-hour day.	Met
Mean Reaction Time	15 seconds.	Met
Launch Sequence	Less than 1 second.	Met
Energize System from Standby	Less than 40 seconds.	Met
Crew Size	Operate by one man; five man crew.	Met
Reload (rounds/minute)	4/5	Met

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Emplacement Time	45 seconds.	Met
Launching Station Weight (empty)	10,000 pounds.	8,726 pounds
Minimum/Maximum Intercept Range 2/	MIM-72A:	
	MIM-72C:	
Fuze: MIM-72A 3/		Met
MIM-72C 4/		Met
Warhead: MIM-72A		Met
MIM-72C		Met
System Mean Effectiveness (Benign Environment)		
Accuracy (Successful Intercepts)	Not Specified	
Direct Hits	Not Specified	

b. Forward Area Alerting Radar (FAAR): 5/

Probability of Detection		Met
Range		Met
Elevation		Met
Altitude		Met
Emplacement	20 minutes.	Met
March Order	15 minutes.	Met
Frequency	Not Specified	
Scan Rate		
Radar Mean Time Between Failures	100-350 hours.	142 hours

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

1/ MIM-72A performance was demonstrated during engineering test, service test, and initial production test. MIM-72C performance was demonstrated during prototype and engineering tests, Development Test II/Operational Test II, and Initial Production Test.

2/

3/

4/

5/ FAAR performance was demonstrated during engineering, service, initial production, and tropic tests.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	12500	3143	10100	6420	0	187486
	QUANTITIES						
	Missiles/Ground Support Equipment Sets						55/2
D690	Surface-to-Air Missile HAWK/ HAWK Improvement Program (SAM HAWK/HIP)	12500	3143	10100	6420	0	187486

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Development work in this program is to upgrade Improved HAWK system effectiveness, maintainability, and survivability to meet the projected electronic countermeasures and antiradiation missile threat into the 1980's.

C. BASIS FOR FY 1980 RDTE REQUEST: Provides for support of effort for Improved HAWK missile electronic countermeasures (ECM) upgrade; to conduct systems analysis in support of Army planning for the Improved HAWK to PATRIOT transition; and for support of the Improved Pulse Acquisition Radar (IPAR) Emission Control (EMCON) and IPAR Ultra-Low Sidelobe Antenna (ULSA) Produce Improvements.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Engineering Development Contract Awarded	November 1964	November 1964
Initial Operational Capability	November 1972	November 1972

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	12538	3143	6593	3920	179842

FY 1980 increase reflects support required for the Missile Electronic Countermeasures (ECM) upgrade program. Increase in total estimated cost is due to additional funding required for the missile ECM upgrade program in FY81.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)	91500	72270	36500	9400	11200	969670
Funds (as shown in FY 1979 submission)	93300	72270	60497	-	10180	989600
Quantities						
Missiles/General Support Equipment Sets (current requirements)	509/0	608/0	197/0	0/0	0/0	5328/98
Missiles/General Support Equipment Sets (as shown in FY 1979 submission)	509/0	608/0	500/0	-	0/0	5631/98
Military Construction, Army:						
Funds (current requirements)	0	0	0	0	0	1300
Funds (as shown in FY 1979 submission)	0	0	0	0	0	1300

Change in FY 1980 program due to Army decision adjusting the missile procurement quantity from 500 to 197. Program completion change is due to an increase in quantity of replacement rocket motors (based on 7 year shelf life) and cost escalation factors.

AD-A067 087 DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/G 5/1
DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS OF THE RESEARCH, DEV--ETC(U)
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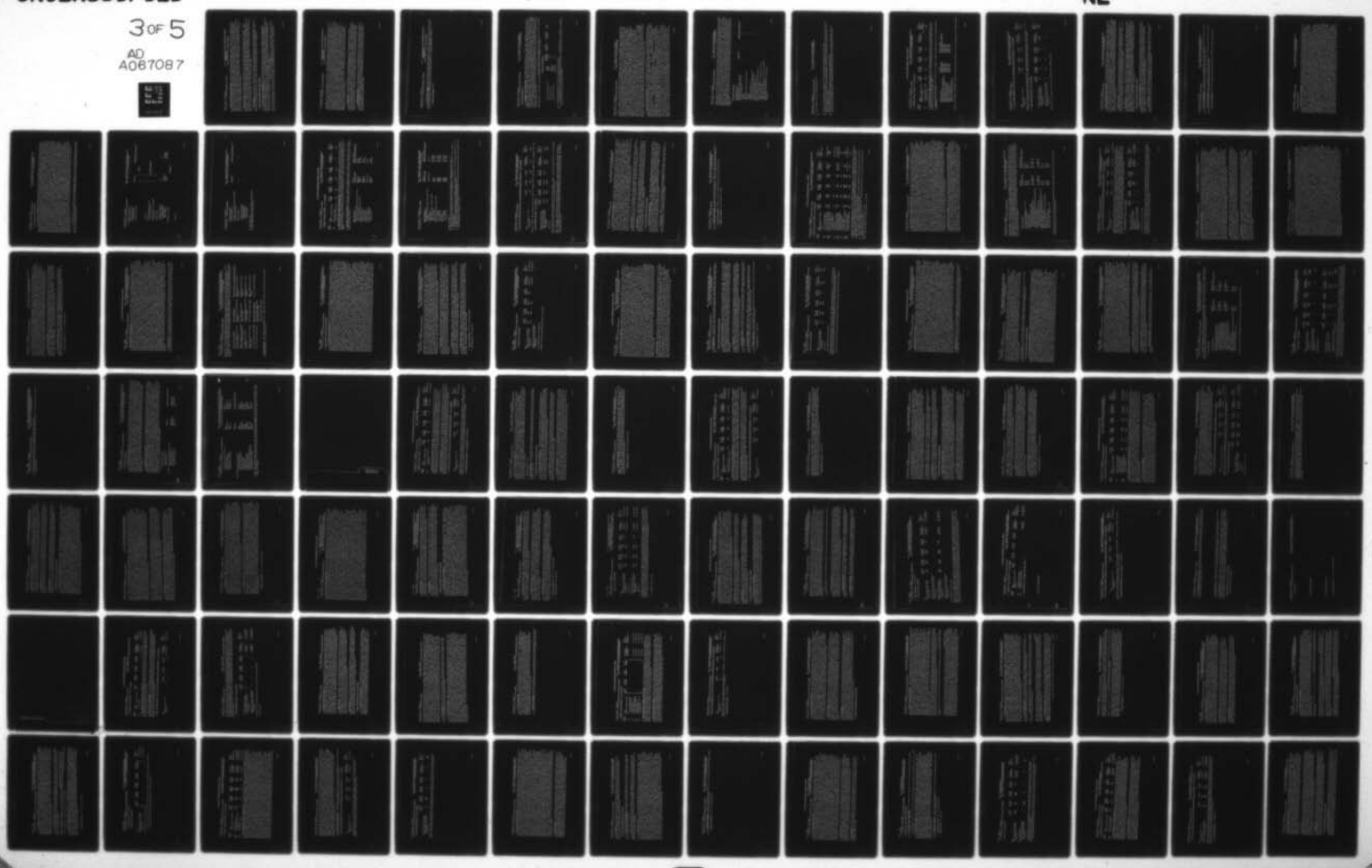

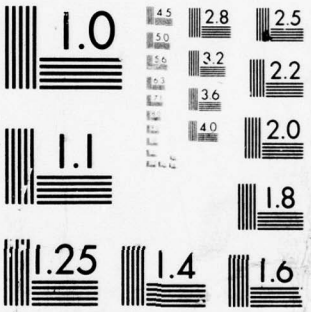

MICROCOPY RESOLUTION TEST CHART
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Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HAWK Improvement (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: Technical assessments and operational testing confirmed the low reliability of the Basic HAWK System. Consequently, a HAWK Improvement Program (HIP) was initiated in 1964 to meet the Soviet high performance fighter and light bomber threats until replaced by Surface-to-Air Missile Development (SAM-D). The HAWK Improvement Program provides a significant increase in HAWK System effectiveness due to a new missile, reduced reaction time by the addition of a computer, and electronic warfare counter-countermeasures. Modifications to the various radars and other ground support equipment were also developed to incorporate built-in test equipment and to achieve compatibility with the new missile and computer. Development of additional product improvements was initiated in FY 1973 to correct significant field problems and to enable the system to meet threat requirements into the 1980's.

G. RELATED ACTIVITIES: The United States Marine Corps is actively participating in the HAWK Improvement Program. Program coordination is accomplished by exchange of technical reports and attendance at scientific meetings and conferences. The Identification Friend or Foe (IFF) System (AN/TPX-46) for HAWK is part of a National Defense Program. (Program Element #6.47.09.A, IFF Equipment.) The North Atlantic Treaty Organization (NATO) HAWK Consortium, under the HAWK European Limited Improvement Agreement, contracted directly with United States industry to convert their HAWK assets to the Improved System. Under the United States-Japan Coproduction Agreement, Japan is manufacturing Improved HAWK.

H. WORK PERFORMED BY: The Project is managed by the United States Army Missile Materiel Readiness Command (MIRCOM), Huntsville, AL. It is conducted by contract and in-house efforts. The prime contractor is Raytheon Company, West Andover, MA. Other contractors are Westinghouse Electric Corporation, Baltimore, MD, and Applied Devices Corporation, Hauppauge, NY.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The HAWK Improvement Program was initiated in November 1964 and engineering development was completed in FY 1969. A series of flight test programs from March 1970 to September 1971 demonstrated the required performance and high reliability of the new missile and led to subsequent system type classification Standard A in December 1971. A combined Development Test III/Operational Test III (DT III/OT III) was conducted from May through July 1972 and led to a decision to field the system. The first battalion's Initial Operational Capability (IOC) was 10 November 1972. Missile modifications were developed to increase missile capability against Flight tests of these modifications were successfully completed in July 1974 and approved for incorporation into production and for retrofit. A development program to provide selected system improvement to correct identified problems and to meet threat requirements into the 1980's was initiated in FY 1973. Development was

completed on four of these improvements in FY 1977: (1) new modulator-oscillator for the Improved Continuous Wave Acquisition Radar (ICWAR); (2) new Digital Signal Processor for the Improved Pulse Acquisition Radar; (3) hardware associated with increasing the memory of the Automatic Data Processor (ADP) in the Information Coordination Central. This improvement also includes a digital computer-to-computer interface with the AN/TSQ-73 Air Defense Command and Control System; and (4) an optical tracking adjunct system and Emission Control (EMCON) capability for the Improved High Powered Illuminator Radar (IHPI). Development was terminated in FY 1977 on several improvements such as improved system mobility based on Army plans to field the PATRIOT system on an accelerated basis. Continued development in FY 1978 of previously stated product improvements and system analysis in support of Improved HAWK/PATRIOT transition. Development continued and testing was initiated for the Ultra Low Sidelobe Antenna (ULSA) for the Improved HAWK Pulse Acquisition Radar (IPAR) to improve its detection capability in an electronic countermeasures (ECM) environment. Development continued on an Emission Control (EMCON) modification to improve the survivability of the IPAR in an Antiradiation Missile (ARM) environment and on an active fuze for the Improved Missile to improve its performance in an ECM environment. Additionally, a military utility test of the Tracker Adjunct System (TAS) was conducted in FY 1978 in Europe. This test identified several shortcomings requiring redesign/retest in FY 1979 prior to initiation of production.

2. FY 1979 Program: Continue development of the IPAR EMCON modification and conduct Development Test II (DT II) testing; complete DT II testing for the IPAR ULSA modification; perform reliability, availability, and maintainability (RAM) performance testing for the Improved High Power Illuminator (IHPI) RAM/EMCON product improvement; continue system analysis in support of Improved HAWK/PATRIOT transition; perform Product Improvement Verification Test (PIVT) of the Improved Continuous Wave Acquisition Radar (ICWAR) transmitter, IPAR Digital Signal Processor, and increased memory and AN/TSQ-73 Air Defense Command and Control System data link modifications; and complete the analysis of the missile shelf-life extension program.

3. FY 1980 Planned Program: Continue development of the IPAR EMCON modification; continue systems analysis in support of the Improved HAWK/PATRIOT transition; conduct PIVT testing of the IPAR ULSA Product Improvement; and initiate development of an electronic countermeasures (ECM) upgrade of the Improved HAWK missile. This effort will support the design, development, test, and documentation to upgrade the performance of the Improved HAWK Missile in an advanced ECM environment and keep Improved HAWK viable to meet the 1980's threat.

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HAWK Improvement (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

4. FY 1981 Planned Program: Product Improvement Verification Test (PIVT) testing of the Improved Pulse Acquisition Radar (IPAR) Emission Control (EMCON) modification and the Tracker Adjunct System. Continue development in support of the Missile electronic countermeasures (ECM) Upgrade; and system analysis in support of the Improved HAWK/PATRIOT transition.

5. Program to Completion: None.

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HIP
Budget Activity: #4 - Tactical Programs

J. TEST AND EVALUATION DATA:

1. Development Test and Evaluation: The Improved HAWK Development Test II began with an Engineering Test/Service Test conducted Janaury through December 1969 during which 16 missiles were fired. Special missile "CORE" tests were conducted March through July 1970. After a review of the "CORE" test results, fuze improvements were made and a Performance Demonstration Test (PDT) was conducted from January to April 1971. All of the PDT performance objectives were met but the reliability of the missile was less than required. Following action taken by the contractor (Raytheon Company, West Andover, MA) to improve quality control, a reliability demonstration test was conducted August through September 1971. Eighteen scorable flights showed a point reliability of DT III (Initial Production Tests) were conducted May through November 1972. All missile requirements were met but test results directed investigation toward improving performance against multiple and maneuvering targets. Six modifications were successfully tested in July 1974.

The six modifications were approved for production and retrofit into previously produced missiles. A tabulation of Improved HAWK Missile firings as of 30 September 1978 follows:

Summary of Test Firings

	Dates	Attempted Firings 2/	Successful Flights 1/	Unsuccessful Flights	No Test
Development/Operational Test	Aug 67 Jul 74	150 3/			
Lot Acceptance Test	May 72 Continuing	112			
Annual Service Practice	Mar 74 Continuing	326			

1/ Successful flights were those in which the test objectives were met.
2/ of these launches were in a tactical configuration and resulted in successful flights, failure, and no test.
3/ 21 of these firings were to test missile modification and were of several configurations to support differing test objectives and were therefore not scored as success or failures.

In addition to missile firing tests, temperate zone development tests were completed in November 1969, tropic zone tests were completed in December 1973 and arctic zone test were completed in March 1974. An integrated Development Test/Operational Test (DT/OT) II test of four product improvements was completed during FY 1977: (1) new transmitter (modulator-oscillator) for the Improved Continuous Wave Acquisition Radar (ICWAR); (2) new digital signal processor for the Improved Pulse Acquisition Radar (IPAR); (3) increased memory of the Automatic Data Processor (ADP) and computer-to-computer interface with the Air Defense Command and Control System, AN/TSQ-73, and (4) optical tracking adjunct system. The four product improvements were subjected to an integrated test jointly planned and conducted by contractor, Government developmental and Government operational test representatives. The first phase of test measured system performance, using approximately sixty aircraft tracking missions and was followed by environmental roadability and Reliability, Availability, and Maintainability (RAM) tests. An I-HAWK Battery modified with the four product improvements was successfully used to fire two lot acceptance missiles. DT/OT testing was completed on three of the four product improvements in July 1977. Based on test results, affirmative hardware production decisions were made on the ICWAR transmitter, IPAR digital signal processor, and ADP increased memory in August 1977. The optical tracking adjunct system was subjected to further testing in Europe from January thru May 1978. A review of the Tracking Adjunct system program after the test indicated a concern over the tactical mean time between failure which led to a requirement for a detailed analysis of the failure causes. This analysis will be followed by a redesign/retest effort in FY79. Coordinated testing was initiated in FY78 for the Improved Pulse Acquisition Radar (IPAR) ultra low side lobe antenna (ULSA) product improvement, with a production decision scheduled for early FY79. Contractor verification tests to support the initiation of coordinated testing of the Army Tactical Data link software was initiated in FY78 and will continue during early FY79.

2. Operational Test and Evaluation: The Improved HAWK Initial Operational Test and Evaluation (IOTE) was conducted May through July 1972 at McGregor Range, New Mexico. Typical military personnel conducted round-the-clock operation of the equipment, engaged 405 live aircraft tracks and conducted live firings. Thirty-seven minor deficiencies were discovered during test. These minor deficiencies have since been corrected. Reliability failure in out of missiles fired during the test indicated that normal handling by troops might adversely affect missile reliability. The Combat Development Command (CDC) recommended additional tests. FY 1970 missiles were subjected to extensive field handling. of these missiles successfully passed theater readiness monitoring facility (TRMF) tests. of these missiles were fired and all successfully intercepted targets, thus indicating that field handling has no adverse effect on missile reliability. An In-Process Review on 15-16 August 1972 directed immediate fielding. The Improved HAWK became operational in Europe on 10 November 1972. The Operational Test and Evaluation Agency (OTEA) conducted a follow-on test during June and September 1973 in Europe to ascertain that earlier noted deficiencies had been corrected. Problems were noted in areas of communications, Identification Friend or Foe (IFF), supply and generators. Improvements in all four of these areas have since been effected. Overall analysis indicated that the system performed extremely well in an operational environment against a realistic threat. During March and April 1977, the user conducted a four-week operational test of four product improvements: (1) new Improved Continuous Wave Acquisition Radar (ICWAR) transmitter; (2) new Improved Pulse Acquisition Radar (IPAR) digital signal processor; (3) increased Automatic Data Processor (ADP) memory and computer-to-computer interface with the AN/TSQ-73 fire distribution system; and (4) optical tracking

adjunct system. The test included a two week period of continuous, around-the-clock operation. Approximately thirty aircraft tracking missions were conducted during the test period. The test set up consisted of two remotely located HAWK firing units interconnected by the Army Tactical Data Link (ATDL) through the AN/TSQ-73 Air Defense Command and Control System. It was demonstrated that target information could be passed automatically from computer-to-computer. Target acquisition information acquired by one firing unit was passed across the data link and used by a remotely located fire unit to designate the tracking radar and achieve target track. Operational Test (OT) II testing on three of the four product improvements was completed in April 1977. Based on test results, decisions to proceed with hardware production were made on the Improved Continuous Wave Acquisition Radar (ICWAR) transmitter, Improved Pulse Acquisition Radar (IPAR) digital signal processor, and Automatic Data Processor (ADP) increased memory in August 1977. Follow-on testing of the optical tracking adjunct system was conducted in Europe, January thru May 1978, with the identification of several shortcomings which will be corrected prior to initiation of production.

3. System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
Intercept Dead Zone (slant range-km)		
Max Intercept Range (slant range-km)		
Intercept Altitudes (km)		
Minimum		
Maximum		
Target Speed Handling Capability (M/Sec)		
Minimum		
Maximum		
Average Reaction Time (sec)		
Automatic Operation in Low Altitude, Non-Electronic Countermeasure (ECM) mode		
Missile Mission Reliability 4/		
Inherent System Availability (Al) 5/		
Systems Probability of Detection Evaluation and Transfer (PDET) (no ECM)		
Probability of Single Shot Kill (PSSK)(MIG-21, K-Kill)		
Single Target (no ECM)		
Single Target in a Multiple Target Formation (no ECM) 6/		
Single Target (ECM deception)		
Inherent System Effectiveness (ES) (Single Target, no ECM) 5/		

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HIP
Budget Activity: #4 - Tactical Programs

1/ Improved HAWK test reports through September 1977.
2/

3/ Limited by target capability. Simulated tests show the development estimate can be accomplished.
4/ Defined as the success versus attempt ratio for a particular test of completing the launch, guide on target, and fuze operation without malfunction for a variety of mission profiles (multiple, single Electronic Countermeasure (ECM) targets) which the missile is designed to handle.
5/ Inherent availability and effectiveness do not include actual support environment.
6/ The Probability of Single Shot Kill (PSSK) results from computer simulations with the six missile modifications and is an average across the performance envelope. The simulations have been validated by live firings against multiple targets.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3885	5110	3346	971	0	14362
	QUANTITIES (XM74)						To be determined
D231	Improved Nonnuclear LANCE Warhead Section	3885	5110	3346	971	0	14362

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop improved munition and incorporate into M251 Nonnuclear Warhead Section to double the effectiveness of Nonnuclear LANCE. The Army Authorized Objective for Nonnuclear LANCE is based on the effectiveness of the improved Warhead Section.

C. BASIS FOR FY 1980 RDTE REQUEST: Conduct tests and test analyses to qualify the XM74 bomblet for use in the M251 Nonnuclear Warhead Section.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Begin Improved Bomblet Development	October 1976	October 1976
Improved Bomblet Final Design Selected	October 1978	October 1978
Begin Warhead Section Loading	December 1978	January 1979
Begin Development Testing	January 1979	August 1979
Complete Development Testing	January 1981	January 1981
Release for Production	January 1981	January 1981
Complete Production of Improved Nonnuclear LANCE Warhead Sections		

Warhead section loading and development testing will begin earlier than indicated in the FY 1979 submission due to program progress.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4218	5921	3000	0	14189

Funding for FY 1978 was reduced from $4218 thousand to $3885 thousand and from $5921 thousand to $5110 thousand in FY 1979 to fund other higher priority Army requirements. The increases in FY80 and FY81 compensate for this reduction.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Missile Procurement, Army:						
Funds (current requirements)	0	0	0	17600	236	17836
Funds (as shown in FY 1979 submission)	0	0	0	0	17159	17159
Quantities (current requirements)	0	0	0	0		
Quantities (as shown in FY 1979 submission)	0	0	0		0	

Increased cost in tungsten has caused total estimated cost to increase as shown.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The Nonnuclear LANCE (NNL) missile system is an all weather, general support artillery system to provide nonnuclear fires on high priority targets. NNL is type classified Standard and is currently being produced for US and foreign military sales. The US Army has been authorized and funded to procure NNL missiles, in FY 1977 and in FY 1978. The long term objective of this improvement program is to the effectiveness of the Nonnuclear LANCE Missile System with a unit price increase of $15 thousand (FY 1976 constant $) to be accomplished by development and incorporation of an improved munition. Tasks to be completed in FY 1980 are: development to quality the improved bomblet for use in the LANCE system; system studies to assure all system performance operational requirements are met; and purchase of long lead time items to support flight test programs in subsequent years.

G. RELATED ACTIVITIES: The US Army Armament Research and Development Command, Dover, NJ has demonstrated the feasibility of improving the XM74 bomblet by incorporating high density fragment materials for use against light materiel and personnel. US Air Force Project Program Element 6.46.02.F has investigated and evaluated improvements to similar munitions. Similar efforts by other Services are coordinated with this program to preclude duplication of effort.

H. WORK PERFORMED BY: Honeywell Inc., Hopkins, MN; Vought Corporation, Michigan Division, Warren, MI; Chamberlain Manufacturing Corporation, Waterloo, IA; AJAX Hardware Corporation, City of Industry, CA; Mallory Matallurgical Corporation, Indianapolis, IN; Kulity Tungsten Corporation, Richfield, NJ; Alcoa Aluminum, Cleveland, OH; Ordnance Research Institute, Fort Walton Beach, FL; Martin-Marietta Corporation, Milan, TN; Teledyne Corporation, Powder Alloys Division, Clifton, NJ; Wah Chang Division, Albany, OR; US Army Missile Research and Development Command, Huntsville, AL; Project Manager for Selected Ammunition, Dover, NJ; and US Army Armament Research and Development Command, Dover, NJ. (Anticipated Bidders Listed.) US Army Missile Research and Development Command, Huntsville, AL, is responsible for the program.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Prototype bomblets were tested and fragmentation data developed. Vulnerability data was generated for some LANCE targets. Data has verified theoretical effectiveness calculations. Mass properties of the improved bomblet were measured by using prototype hardware. Development testing of the XM74 bomblet and system studies and analysis aimed at incorporation of the bomblet into the LANCE Nonnuclear Warhead Section were conducted. Contracts for missile and warhead components have been placed to support full-scale LANCE flight tests.

2. FY 1979 Program: Significant activities include selection of the Improved XM74 bomblet final design and system studies and analysis to support incorporation of the improved bomblet into the LANCE Nonnuclear Warhead Section. Full-scale LANCE flight tests will be conducted to qualify the improved bomblet in the LANCE system.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

3. FY 1980 Planned Program: A Development Test II/Development Test III flight test program will be conducted in FY 1980. This test program will lead to type classification of the improved LANCE Nonnuclear Warhead.

4. FY 1981 Planned Program: Type classification is scheduled for January 1981. The improved munitions will be procured and retrofit of the inventory of LANCE Nonnuclear Warhead Sections will begin.

5. Program to Completion: Retrofit of warhead sections will continue and is scheduled for completion in July 1983.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

J. TEST AND EVALUATION DATA:

1. Development Test and Evaluation: The prime contractor for the LANCE Missile System is the Vought Corporation, Sterling Heights, MI. A total of 422 US LANCE missile flight tests have been conducted since the LANCE firing program began in 1965 through October 1978. The contractor and White Sands Missile Range integrated team have fired 181 engineering development missiles. Ninety-three missiles were fired during the time period January 1970 through October 1978 - Development Test (DT) I (nuclear) - 27; DT II (nuclear) - 30; DT I (nonnuclear) - 23; DT II (nonnuclear) - 6; DT III (nonnuclear) - 7. The remaining 88 contractor firings were for early prototype testing, stockpile sampling, and product assurance for the period 1965 through October 1978. The Army firing program of 241 missiles through October 1978 included early operational testing (38), annual service practice (173), safety certification (6), and Operational Test (OT) II of the current configured system (24). Environmental testing was conducted at Fort Greely, AK, from October 1969 to February 1970, and at Fort Sherman, Panama, from April 1970 to February 1971. The tests at Fort Greely included a live firing. Reliability, availability, and maintainability were scored during DT/OT II and are addressed in the Operational Testing Section. A problem with the warhead fuze (XM811) was a primary cause for delay in the Nonnuclear LANCE (NNL) Warhead Development Program. The combined DT/OT II program, using new production fuzes, was resumed in April 1974 and completed in July 1974. The revised program consisted of eleven live firings of the XM251 nonnuclear warhead (6 DT II and 5 OT II). The first of the 11 warhead flights was the tenth and final round of the engineering design test (12 April 1974). An additional 13 new production fuzes (XM811E6) were successfully fired on regularly scheduled annual service practice (ASP) missiles in order to increase confidence in the fuze (the 13 ASP flights were not counted as part of DT/OT II). The XM251 warhead was type classified Standard on 23 October 1974. The LANCE Nonnuclear Warhead Section DT III Program consisted of a 7 round program, six production warhead sections and one DT II configuration warhead section that had been exposed to 6 months simulated battalion storage. The flight tests began 19 November 1975. After two successful flight tests, three tests yielded abnormally high dud rates and the DT III program was delayed in April 1976 to investigate the causes of the high dud rate. It was concluded that combined producibility changes made in the production items caused the duds. Corrections were applied based on original drawings. Three nonnuclear warhead sections were flown in July 1976 thru September 1976 that aided in the dud rate investigation. Two remaining rounds were successfully flight tested in October 1976 completing DT III. A nine round flight test DT II/DT III test program is planned for the improved nonnuclear LANCE system to demonstrate that all technical performance requirements are satisfied. In addition to this flight test series, a three round nonflight series is planned during DT II/DT III to evaluate safety and verify hazards classification. These tests are planned for FY 1980.

2. Operational Test and Evaluation:

a. A combined Development Test (DT)/Operational Test (OT) II of the LANCE Missile System was prepared by the US Army Test and Evaluation Command (TECOM) and the US Army Training and Doctrine Command (TRADOC) so that the test could provide both developmental evaluation data and operational data. The tests were conducted at White Sands Missile Range, NM, during June 1971 through March 1972 using missiles and equipment from hard tooled production lines by an HONEST JOHN field artillery battalion organized as a provisional LANCE battalion. A separate evaluation and a report were accomplished by TRADOC. Extensive field exercises and 19 firings were conducted by the provisional battalion. Deficiencies were found in the Guided Missile System Test Set (GMSTS) and Monitor Programmer (MP). The LANCE Missile System minus these items was type classified Standard on 23 May 1972. Inflight reliability, preflight reliability after loading and checkout at the firing site, and ground support reliability were all met; however, the ground mobility of the lightweight launcher was more restricted than desired when towed over rough terrain and requirements for modification of the checkout equipment were identified. The testing of corrections of OT deficiencies and system accuracy are included in the Joint Army/Atomic Energy Commission (AEC, now Energy Research and Development Agency (ERDA)) testing (June 1972-January 1973). Testing verified deficiencies noted in the GMSTS and MP, and these were corrected and the GMSTS and MP were type classified Standard. Testing of operational suitability (OT III) was conducted in conjunction with the six missile annual service practice and operational readiness test of the 1st Battalion, 12th Artillery, evaluated by TRADOC in December 1972. The US Army Operational Test and Evaluation Agency (OTEA) tested doctrine and tactical employment of the system during a battalion operational readiness test conducted at Fort Sill, Oklahoma, March-April 1973. Test results revealed that doctrine, organization, training, and support packages were adequate. Some minor changes in organization and the training support package were identified. Operational Test II of the Nonnuclear LANCE was conducted in two phases concurrently with, but separately from, DT II of the XM251 warhead. Phase I (nonfiring) was conducted 8-19 April 1974 at Fort Sill, OK, by OTEA and evaluated operational effectiveness, reliability, and maintainability. Phase II (firing) was conducted 25 April-25 May by OTEA at WSMR and consisted of five live firings. Both phases were independently evaluated by OTEA, and data generated by live firings was used for reporting both DT II and OT II results. No major discrepancies were identified during this test, and no further operational testing of the nonnuclear system is currently planned. The nonnuclear warhead for LANCE was type classified Standard in October 1974.

b. No operational tests are planned on the Improved Nonnuclear LANCE because the man-machine interface has not changed from that of the Basic Nonnuclear LANCE (incorporation of Improved BLU-63 bomblets into the Nonnuclear LANCE Warhead Section will not affect the man-machine interface).

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

3. Systems Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
	Nuclear	
System Accuracy (CEP):		
Range (km)		
Missile Preflight (at Launch Checkout) Reliability	Nuclear/Nonnuclear	
Missile Inflight (Less Warhead) Reliability		
Maintainability:		
Inherent Availability	.80	.78
Mean-Time-to-Repair		
Organization Level	55 minutes	51 minutes
Direct Support	4 hours	2.9 hours
General Support	9 hours	Not Tested
	Nonnuclear	
System Accuracy (CEP):		
Range (km)		

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Preflight (at Launch Checkout) Reliability		
Inflight Reliability		
Maintainability:	3/	3/
Inherent Availability		
Mean-Time-to-Repair		
Organization Level		
Direct Support		
General Support		

1/ As of 26 Oct 78.
2/ This figure represents the cumulative program value.
3/ Same as Nuclear System characteristics.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	9900	9996	6600	4500	0	61739
DE01	M60A1 Tank Product Improvement Program (PIP)	9900	9996	6600	4500	0	61739

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides for continuing improvements of the M60 series tanks in firepower, RAM (Reliability, Availability, and Maintainability), survivability, and night capability as well as for training devices to enhance crew performance. Improvement to the M60 series tanks is necessary to counter potential enemy armor threats in the near timeframe until replacement by the XM1 and after that as the mainstay of the reserve component forces for the period of the 1990's.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds will be provided for engineering design of adaption hardware for a series of Army standard components developed by other Government agencies, development a muzzle position sensor, an automatic fire extinguisher system, and training devices.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Muzzle Position Sensor		
Development Test (DT)/Operational Test (OT) I	2QFY79 1/	4QFY78
DT/OT II Completed	3QFY80 1/	1QFY80
Production In-Process Review (IPR)	4QFY80	Not Shown
Adaption Hardware		
DT/OT II Completed	3QFY80 2/	3QFY79
Production IPR	4QFY80 2/	Not Shown
XM1 Track Adaption		
Production IPR	Terminated 3/	3QFY79
Auto Fire Extinguisher		
DT/OT II Completed	3QFY80 2/	3QFY79
Production IPR	4QFY80	Not Shown

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Auxiliary Power Unit		
Development Test (DT)/Operational Test (OT) I Completed	Terminated 4/	4QFY79
Training Devices		
M60A3 Conduct of Fire Trainer (UCOFT)		Not Shown
DT/OT II Complete	1QFY81	Not Shown
Production IPR	2QFY81	Not Shown
M60A3 One Station Unit Trainer (OSUT)		
DT II Complete	2QFY81	Not Shown
OT II Complete	3QFY81	Not Shown
Production IPR	4QFY81	Not Shown
M60A1 UCOFT		
DT II Complete	2QFY81	Not Shown
OT II Complete	3QFY81	Not Shown
Production IPR	4QFY81	Not Shown

Reasons for Change:

1/ Muzzle Position Sensor (MPS) DT/OT delayed pending availability of adequate test range facilities.

2/ Testing of the Adaption Hardware and Automatic Fire Extinguisher are "piggybacked" on the MPS test and are therefore likewise delayed.

3/ XM1 Track Adaption was terminated as the aluminum track being examined was shown to be not feasible; improved steel track development work continues at TARADCOM under Program Element 6.36.31.

4/ Auxiliary Power Unit work has discontinued pending development of the XM1 Auxiliary Power Unit which, when completed, will then be considered for adaption to the M60.

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	9831	9996	13500	6162	73508

Reasons for change: FY80 funding was reduced as a result of terminating work on XM1 Track Adaption and the Auxiliary Power Unit.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Weapons and Tracked Combat Vehicles Procurement, Army:						
Funds (current requirement)	41500	132400	117400	129900	362800	914775
Funds (as shown in FY 1979 submission)	41500	98400	124800	-	297000	702500
Quantities*						

*Varying quantities of different modification kits are being procured. Examples of major kits being procured are the Laser Range Finder, Solid State Computer, Tank Thermal Sight, and Improved RISE Engine.

Reasons for changes: FY 1979 funds were increased by $34.0M by Congress to increase number of M60A3 conversions from 220 to 380. FY 1980 funds reduced by $7.4M due to curtailed conversion program as a result of previous year increase. FY 1981 and future year funds are increased as Army requirements for M60A3 tanks remains fixed, new production is decreased, and conversions are necessarily increased.

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The M60A1 tank, an improved version of the M60 tank, was type classified Standard A in December 1961. Phase I of the M60A1 Product Improvement Program which included a main gun stabilization system, a solid-state ballistic computer, a laser rangefinder, an improved reliability engine, T142 replaceable pad track, an improved electrical system, top-loading air cleaners, and passive night vision devices, to include the tank thermal sight, was completed and is now in procurement. Phase II of the program was initiated in FY 1976 and includes a muzzle position sensor, an engine smoke generator, an automatic fire extinguisher system, and adaption hardware consisting of work on improved commander's and gunner's seats, potable internal water stowage, foliage brackets, and the adaption kits for developed components including a radiac detector, chemical alarm, heading reference unit, and speech security equipment. Also included is a joint effort with the XM1 to provide training devices for the M60 series tanks. Included in this effort are the Unit Conduct of Fire Trainers (UCOFT) for the M60A1 and M60A3, a movable classroom simulator used at battalion/squadron level to provide training in critical tasks performed by M60 series gunners and tank commanders; and the One Station Unit Trainer (OSUT) for the M60A3, a ten station gunnery simulator for training large numbers of Armor crewmen in basic and advanced gunnery skills.

G. RELATED ACTIVITIES: In FY 1972 this program was carried as Project DE01 under Program Element (PE) 6.40.04.A, Mobility. Advanced development of the Turret Integrated Xenon Illuminator (TIXI) was accomplished under PE 6.37.17.A, Surveillance, Target Acquisition and Night Observation, Project DK70, Night Vision Devices. The TIXI project was terminated in FY 1976.

H. WORK PERFORMED BY: In-house efforts on this program are accomplished by the Project Manager for M60 Tanks, Warren, MI; US Army Electronics Research and Development Command, Night Vision and Electro-optics Laboratory, Ft Belvoir, VA; Tank Automotive Reserach and Development Command, Warren, MI; US Army Armament Research and Development Command, Dover, NJ. Major Contractors are Chrysler Defense Engineering, Centerline, MI; Hughes Aircraft Company, Culver City, CA; Teledyne-Continental, Muskegon, MI; Texas Instruments, Dallas, TX; and Honeywell, Minneapolis, MN.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: In 1969, a Senior Officer Materiel Review Board recommended that the M60A1 tank be product improved. In 1971, the Top Loading Air Cleaner was introduced followed by Add-on-Stabilization in 1972, T-142 Track in 1974, and the Improved Reliability Engine and Improved Electrical System in 1975. Passive image intensification devices and a Deep Water Fording Kit were added in 1977. In 1978 the AN/VVG-2 Laser Range Finder, the XM21 Solid State Computer, the M239 Smoke Grenade Launcher, and the M240 Machinegun were incorporated. Additionally, Development Testing of the Muzzle Position Sensor, engineering design of Adaption Hardware, and Full-Scale Engineering Development of the Automatic Fire Extinguisher continued; DT/OT II of the Engine Smoke Generator was completed.

2. FY 1979 Program: Completion of DT I and initiation of Full-Scale Engineering Development for the Muzzle Position Sensor. Development work of the Adaption Hardware and Automatic Fire Extinguisher will continue. Engine Smoke Generator will be fielded and development of training devices will be initiated.

3. FY 1980 Planned Program: Development Test/Operational Test II (DT/OT II) complete and production decision for the Muzzle Position Sensor, Adaption Hardware, and Auto Fire Extinguisher. Testing of training devices will be initiated.

4. FY 1981 Planned Program: Complete testing of training devices and make production decisions.

5. Program to Completion: Program completed in FY 1981.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	57591	55210	54812	35976	Continuing	Not Applicable
	QUANTITIES						*
D104	Joint Tactical Communications (TRI-TAC) Office	5873	5996	6100	6205	Continuing	Not Applicable
D110	Mobile Subscriber Equipment	354	2968	4554	8500	140677	157200
D111	Digital Group Multiplexer	10302	2661	2846	2118	1010	38800
D113	Super High Frequency (SHF) Satellite Modulator - Demodulator (Modem)**	921	2300	0	0	0	Not Applicable
D114	Other Service Assigned TRI-TAC Tasks	1422	1470	2071	3588	Continuing	Not Applicable
D116	Facility Support Element	640	500	515	555	Continuing	Not Applicable
D117	Short Range Wideband Radio (SRWBR) Assemblages***	0	1500	800	300	0	2600
D119	Modular Record Traffic Terminal (MRTT)	574	6000	9000	3300	3700	22674
D172	Net Radio Interface (NRI)****	153	2315	626	410	245	5849
D178	Joint Test Support *****	960	1200	1300	1400	Continuing	Not Applicable
D222	Automatic Communications Central Office AN/TTC-39	36392	28300	27000	9600	11800	227600

* Quantities include 9-AN/TTC-39 Circuit Switches, 7-AN/TYC-39 Message Switches, total of 516 items of DGM family (13 components), 6-AN/GRC-144 Radio Set SRWBR Modification Kits, and 3 each prototype assemblages of the AN/TRC-173 Radio Terminal, AN/TRC-174 Radio Repeater, Standard SRWBR Assemblage, the Radio Terminal Set, AN/TRC-175, and the Modified AN/TRC-138 Radio Repeater. Other RDTE quantities represent a number of diverse items.

** This project will be transferred to Program Element 3.31.42.A, Satellite Communications Ground Environment, project D456 - Tactical Communications Systems (TACSATCOM) in FY 1980.

*** Program transferred from USAF to Army in May 1977. FY 1978 funding increased by $2.5 million military interdepartmental purchase request from Air Force.

**** NRI part of Project D110 prior to FY 1978.

***** Joint Test Support part of project D222 prior to FY 1978.

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Joint Tactical Communications (TRI-TAC) Program is a joint Service and DOD Agency program to develop and field future tactical multichannel switched communications equipment required to satisfy the tactical communications needs of the Military Services. The TRI-TAC program was established as a joint program under the Secretary of Defense to achieve interoperability between Army tactical communications systems and other Department of Defense (DoD) telecommunications systems; to provide new tactical communications equipment which reflects the most recent technology; and to eliminate duplication among the Service/Agency communications systems. TRI-TAC developed systems/equipments are needed to provide combat forces with tactical communications equipments to meet the mobility, security, reliability and availability requirements of the modern battlefield, to provide resistance to the intercept and electronic warfare threat of potential enemies, and to reduce life cycle support and personnel costs. The current inventory Army tactical multichannel switched communications systems and equipments are characterized by obsolete, manpower intensive, predominantly manual telephone and record traffic (messages) switchboards; obsolete, low speed, electro-mechanical, unreliable teletypewriters; non-secure analog telephones; a digital, solid state multichannel transmission system capable of only link security and manual technical control and management facilities. Current tactical voice telephone systems are not capable of end to end voice security. Tactical record traffic, while secure, is slow, unreliable and manual. Mobility and tactical flexibility in the division and brigade are reduced by the slow installation and displacement times for the current division multichannel equipments. The Army's implementation of equipments developed under the TRI-TAC program will provide a significant increase in capability over current systems/equipments. The Army's Integrated Tactical Communications System employing TRI-TAC equipments will be capable of end to end voice, record and data security. TRI-TAC equipments bridge the span from the current analog equipments to digital systems. Digital systems/equipments take advantage of Large Scale Integration (LSI) solid state technology for increased reliability and reduced maintenance, size, weight and power consumption; provide increased efficiency of transmission systems without increasing the number of radio systems or radio spectrum occupied; and lend themselves to the cost effective application of voice communications security (COMSEC) and jam resistance techniques. Mobility and installation/displacement items in the division area will be significantly improved thru a Mobile Subscriber Access system that provides the addressability of an automatic telephone system and the mobility and voice security of a net radio. Both voice and record traffic switching functions will be secure, automated and processor controlled, and telephone subscribers will have the capability of end to end security.

C. BASIS FOR FY 1980 RDTE REQUEST: Complete the AN/TTC-39 Circuit Switch Initial Operational Test and Evaluation (IOTE). Continue Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE) on the Digital Group Multiplexer (DGM) family of 13 components and complete DTE/IOTE on the AN/TRC-173/174 Radio Terminal and Repeater Assemblages housing DGM components. These assemblages provide the packaging of inventory multichannel radios and DGM equipments into transportable transmission systems. Conduct DTE/IOTE on the Short Range Wideband Radio (SRWBR) assemblages. The SRWBR incorporated a modification to the high quality current inventory AN/GRC-144 Radio Set without developing a totally new multichannel radio set. It also allows the life cycle of the AN/GRC-144 to be extended and used as the high capacity multichannel radio during the transition to TRI-TAC developed equipments. Complete full scale development and conduct DTE/ITOE on the Net Radio Interface family which provides the secure interface capability for combat net radios into the tactical switched multichannel network of TRI-TAC

developed equipments. Complete full scale development on the Modular Record Traffic Terminal (MRTT) family of secure record traffic equipments to replace the obsolete, low speed, electro-mechanical teletypewriters currently in the field. Monitor the validation contract for the Mobile Subscriber Equipment (MSE). MSE is the secure, mobile, radio-telephone system to replace the limited mobility, non-secure multichannel system currently used at brigade and in the division area. Continue funding support of the TRI-TAC Office, Joint Test Element and Facility Support Element in accordance with DoD Directive 5148.7 and DoD Instruction 5148.8. Continue monitoring other Service assigned TRI-TAC programs to insure Army technical, logistical, training, testing and user requirements are being satisfied.

Major Milestones*	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
Engineering Development Contract Award	Apr 74	Apr 74
Preliminary Design Review	Sep 74	Sep 74
Integrated Test Plan	Feb 75	Feb 75
Final Design Review	Dec 75	Dec 75
Prototype Qualification Test (PQT)		
Start Message Switch/Circuit Switch	May 77/Mar 78	May 77/Mar 78
Complete Message Switch/Circuit Switch	Apr 78/Nov 78	Apr 78/Nov 78
Development Test and Evaluation/Initial Operational Test and Evaluation (DTE-IOTE)		
Start Message Switch/Circuit Switch	Jul 78/Feb 79	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	May 79/Nov 79	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC III) - AN/TYC-39 Message Switch Production Decision	Oct 79	Oct 79
AN/TYC-39 Production Award	Nov 79	Nov 79
DSARC IIIA - AN/TTC-39 Circuit Switch Production Continuation Decision	Sep 80	Sep 80
AN/TTC-39 Production Award	Oct 81	Oct 81
Initial Operational Capability (IOC)	Jun 82	Jun 82

* Milestones shown for Project D222, Automatic Communications Central Office, AN/TTC-39 which is the lead major system TRI-TAC development item in the program element.

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	58847	55210	42715	Continuing	Not Applicable

The majority of the difference in the total estimated cost was due to a $17.3 million increase in project D222, Automatic Communications Central Office AN/TTC-79. As a result of a special DSARC in Nov 1976 the Office of the Secretary of Defense (OSD) directed a revised cost estimate which identified this required increase. This cost estimate is included in the Decision Coordinating Paper (DCP) 135 revision dated, 14 April 1978. In addition, revised cost estimates have decreased the level of funding in project D119, Modular Record Traffic Terminal (MRTT) and project D172, Net Radio Interface (NRI). Also, project D113, Super High Frequency (SHF) Modem, was transferred to Program Element 3.31.42.A, Satellite Communications Ground Environment, project D456, Tactical Satellite Communications Systems (TACSATCOM), beginning in FY 1980.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	0	0	39900	56100	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	0	0	30700	--	Continuing	Not Applicable
Quantities (current requirements)	0	0	*	*	*	*
Quantities (as shown in FY 1979 submission)	0	0	*	*	*	*

* Large number of diversified items.

As a result of a special DSARC in Nov 76, the Office of the Secretary of Defense (OSD) directed a revised acquisition strategy for the AN/TTC-39 switch family which required an increase in procurement quantities and a revised cost estimate which identified a required increase in funding levels. This increase in funds and quantities is reflected in the RDTE profile for FY 1980 estimate, and the Other Procurement, Army FY 1980 estimate.

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: TRI-TAC has been established as a joint Army, Navy, Marine Corps, Air Force, and National Security Agency (NSA) program to: (1) assure compatibility and a high degree of commonality of tactical communications systems and devices used in joint combat force operations; and (2) achieve maximum economy through Joint Service development, acquisition, and follow-on support of tactical communications equipment. TRI-TAC developed equipments will provide a common, integrated, compatible, secure, multichannel tactical communications system for trunking and switching to support US combat forces in the early 1980's. It will interconnect with the Defense Communications Systems (DCS) and have the capability to interface with systems of our allies (i.e., North Atlantic Treaty Organization). The planned TRI-TAC program will provide a Joint Service tactical switched trucking capability for voice and record communications and for data communications to support the employment of evolving computerized weapon systems. Advances in solid-state electronic circuit technology and the increasing availability of low cost, wide band transmission media will be exploited to obtain: (1) a faster rate of information transfer; (2) transmission and voice security; (3) increased mobility through size and weight reductions; and (4) improved reliability and maintainability. The scope of this program includes: (1) costs of operating the TRI-TAC Office, Fort Monmouth, NJ, and the Army share of the Joint Test Element (JTE), Fort Huachuca, AZ, including support contracts; (2) cost of accomplishing acquisition tasks for the TRI-TAC program assigned to the Army by the Office of the Secretary of Defense; and (3) cost associated with monitoring the Army's interest in TRI-TAC tasks assigned to other Services for development. There are nineteen items in the TRI-TAC program which have been assigned to the Services. Seven programs have been assigned to the Army: Automatic Communication Central Office Family (AN/TTC-39 and AN/TYC-39); Digital Group Multiplexer (DGM) family; Super High Frequency (SHF) Satellite Modulator/Demodulator (Modem); and Mobile Subscriber Equipment (MSE); Net Radio Interface (NRI); Modular Record Traffic Terminal (MRTT); and the Short Range Wideband Radio (SRWBR) modifications to the inventory AN/GRC-144 Radio Set.

G. RELATED ACTIVITIES: The Army, Air Force, Navy, Marine Corps, National Security Agency (NSA) and the Defense Communications Agency (DCA) are particiapting agencies in the Joint Tactical Communications (TRI-TAC) program. TRI-TAC is a joint Service program under the guidance and direction of the Director, Joint Tactical Communications (TRI-TAC) Office and is chartered by Department of Defense Directive (DODD) 5148.7, dated 16 February 1976. Related programs include other Service and National Security Agency (NSA) assigned TRI-TAC tasks under program elements 2.80.10.F, 2.80.10.M, 2.80.10.N and 3.34.01.G (Communications Security Equipment). The TRI-TAC Office monitors all of the assigned TRI-TAC programs and any Service/DoD Agency related programs to insure there is no duplication of effort.

H. WORK PERFORMED BY: Overall System architecture and interservice coordination is performed by the Joint Tactical Communications Office (TRI-TAC), Fort Monmouth, NJ. The Director, TRI-TAC Office reports to the Assistant Secretary of Defense for Communications, Command, Control, and Intelligence. Acquisition (development and production) of TRI-TAC equipment is performed by the tasked Service or Agency as assigned by the Secretary of Defense. Current Army contractors are: GTE-Sylvania, Needham Heights, MA, (AN/TTC-39 Family of Switches) Raytheon Company, Sudbury, MA, (Digital Group Multiplexer Family) AMTRON, Midlothian, IL (NRI.), and ITT (SRWBR), Nutley, NJ. The TRI-TAC Office which is totally funded by the Army has one support contractor, Booz-Allen Applied Research, Inc., Tinton Falls, NJ. In-house developing organization for TRI-TAC tasks assigned to the Army is the US Army Communications Research and Development Command, Fort Monmouth, NJ, (Project Manager, Multi-Service Communications Systems (MSCS)).

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: A performance specification was completed and two competitive advanced development contracts were awarded for the AN/TTC-39 family of circuit and message switches in 1972. The two AN/TTC-39 switch contractors submitted prototype model design plans and completed development and testing of prototype models in December 1973. The Defense Systems Acquisition Review Council (DSARC) approved entry into full scale engineering development on 12 April 1974 and an engineering development contract was awarded to GTE-Sylvania on 16 April 1974. Performance specifications were developed for a family of Digital Group Multiplexers and after evaluation of competitive bids, a full scale engineering development contract was awarded to Raytheon Company in May 1975. A study contract was awarded to Communications Satellite Corporation in April 1975 to develop concepts and optimum methods for Army employment of a Super High Frequency (SHF) Demand Assigned Multiple Access (DAMA) Satellite Modulator/Demodulator (Modem). The AN/TTC-39 Automatic Communications Central Office Integrated Test Plan and Final Design Reviews were completed in 1975. Preliminary and Final Design Reviews ware completed in 1976 on the Digital Group Multiplexer (DGM) family. The SHF Satellite Modem study was completed and used to assist in preparation of the performance specification. A Special DSARC Review was conducted in November 1976 on the AN/TTC-39 family of switches due to a projected breach of Development Concept Paper #135 cost and schedule thresholds, and resulted in a revised program baseline that extended the circuit switch schedule by 16 months and the message switch schedule by 9 months. The AN/TTC-39 contractor was directed to implement replanning actions constraining development effort through FY 1977 with a cumulative funding cap of $100.5 million. Research and Development Acceptance Test (RDAT) began on the AN/TYC-39 Message Switch in May 1977 and the first of seven Formal Qualification Tests (FQT) on the AN/TTC-39 Circuit Switch Software was completed in June 1977. DGM models to support the Air Force Technical Communications Control Facilities (TCCF) program were delivered in August 1977. The DGM Prototype Qualification Test (PQT) Test Plan Review was completed in September 1977. Work continued on the efforts to prepare for a Net Radio Interface (NRI) FY 1978 engineering development contract award. Other Service and Agency TRI-TAC assigned programs were monitored. Army provided funding support for the TRI-TAC Office and the Joint Test Element (JTE). During FY 1978 Research and Development Acceptance Test (RDAT) on the AN/TYC-39 Message Switch was completed. Test models were delivered to the Joint Test Facility; and started Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYC-39 Message Switch was started. Design and fabrication on the AN/TTC-39 Circuit Switch was completed and RDAT started. Prototype Qualification Test (PQT) was conducted, RDTE models delivered to the JTF, and DTE/IOTE begun on the Digital Group Multiplexer (DGM) Family. Fabrication continued on the AN/TRC-173 and 174 DGM Assemblages. A Mobile Subscriber Equipment (MSE) Special Task Force was established to prepare the documentation necessary to obtain a Defense Systems Acquisition Review Council (DSARC) I decision to enter advanced development. A Net Radio Interface (NRI) Full Scale Development (FSD) contract was awarded and planning for DTE/IOTE begun. Army began separate funding of the assigned portion (35%) of the TRI-TAC Joint Test Element. The establishment of the Facility Support Element to provide the baseline of inventory equipments necessary to support the testing of all TRI-TAC equipments as required by DoD Instruction 5148.8, 9 April 1976 was completed. Support of the TRI-TAC Office was continued. Efforts to prepare for a FY 1979 Modular Record Traffic Terminal (MRTT) FSD contract award were continued. Engineering development contract for Short Range Wideband Radio (SRWBR) modification to the AN/GRC-144 Radio Set was awarded. Monitoring of other Service assigned TRI-TAC programs was continued.

2. FY 1979 Program: Complete the AN/TYC-39 Message Switch and start the AN/TTC-39 Circuit Switch Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE). Continue the Digital Group Multiplexer (DGM) family DTE/IOTE. Complete fabrication and conduct DTE/IOTE on AN/TRC-173 and 174 DGM Assemblages. Complete AN/GRC-144 SRWBR modification development, assemblage fabrication, and prepare for DTE/IOTE. Continue Full Scale Development (FSD) effort on Net Radio Interface (NRI). Complete Mobile Subscriber Equipments (MSE) Special Task Force, conduct Defense Systems Acquisition Review Council (DSARC) I. Continue operation and maintenance of Facility Support Element to support the TRI-TAC test program. Continue funding support to the TRI-TAC Office and the Joint Test Element. Award FSD contract for MRTT as all necessary work will have been performed and the MRTT will be ready for FSD. Continue monitoring other Service assigned TRI-TAC programs. Funding decrease in FY 1979 from FY 1978 is due primarily to the completion of the AN/TYC-39, AN/TTC-39, and DGM family RDTE equipment fabrication. These items will be undergoing DTE/IOTE during most of FY 1979. Funding increases are primarily for the MRTT FSD Phase.

3. FY 1980 Planned Program: Production decision and award of initial production contract for the AN/TYC-39 Message Switch. Complete DTE/IOTE on AN/TTC-39 Circuit Switch, DGM family and AN/TRC-173/174 DGM Assemblages. Prepare for and conduct DSARC III on AN/TTC-39. Award validation phase contract and continue validation efforts on MSE. Complete FSD on NRI and start DTE/IOTE. Continue FSD on MRTT. Complete DTE/IOTE on the AN/GRC-144 SRWBR modification and associated assemblages. Continue monitoring other Service assigned TRI-TAC programs. Continue operation and maintenance of Facility Support Element to support the TRI-TAC test program. Continue funding support to the TRI-TAC Office and the Joint Test Element.

4. FY 1981 Planned Program: Conduct initial production release of AN/TTC-39, Circuit Switch. Conduct DTE/IOTE on NRI. Complete FSD MRTT and conduct DTE/IOTE. Complete DTE/IOTE on the AN/GRC-144 SRWBR modification and associated assemblages. Continue monitoring other Service assigned TRI-TAC programs. Continue operation and maintenance of Facility Support Element to support the TRI-TAC test program. Continue funding support to the TRI-TAC Office and the Joint Test Element.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D104
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Joint Tactical Communications (TRI-TAC) Program is a Joint Service and Defense Agencies program for the development and acquisition of a family of tactical communications equipments which will replace the current inventory of predominately manpower intensive manual and non-secure tactical multichannel switched communications equipments in each Service. The major thrusts of the program are to provide equipment and systems that are common/interoperable between Services, that permit the transitioning from analog to digital communications, that are capable of end to end security to meet national goals and that reduce life cycle cost/manpower requirements thru automation, technological advances and improved supportability. Each Service/Agency is tasked by the Secretary of Defense as the acquisition agency for elements of the TRI-TAC program. The tasked Service/Agency totally funds the R&D effort for the tasked item of equipment and becomes the procuring Service for all Department of Defense (DOD) quantities. Additionally, each Service/Agency is required to budget for its assigned pro-rata share of the TRI-TAC Joint Test Element. Overall joint management of the program is performed by the Joint Tactical Communications (TRI-TAC) Office. The TRI-TAC Office was established by the Secretary of Defense through Department of Defense Directive 5148.7 and the Director, TRI-TAC Office is under the primary staff supervision of the Assistant Secretary of Defense for Communications, Command, Control and Intelligence. The purpose of Project D104 is to provide the funding support to the TRI-TAC Office as tasked to the Army in DOD Directive 5148.7. TRI-TAC Office funding levels are recommended by the Director, approved by the Assistant Secretary of Defense for Communications, Command, Control and Intelligence (ASD(C3I)) and then programed by the Army in Program Element 2.80.10.A. The Director is responsible for system definition and engineering of TRI-TAC systems and equipments and serves as the architect (system engineer) and principal planner for the TRI-TAC program. He serves as the single point of coordination for technical aspects of TRI-TAC matters as may arise between the US and NATO and other allied governments. He prepares equipment specifications, performs equipment configuration control, maintains integrity of systems design, prescribes the technical and performance standards for TRI-TAC systems and equipments; and prescribes interface design and specifications to assure overall system compatibility and satisfaction of performance requirements. He is also responsible for coordinating the conduct, planning and reporting of joint Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE) of TRI-TAC systems and equipments to include the establishment and overall management of a Joint Test Element and a Joint Test Facility. In addition, the Director coordinates the production planning of TRI-TAC systems and assists the ASD(C3I) in the management of financial resources authorized for the development and acquisition of TRI-TAC systems and equipment.

B. RELATED ACTIVITIES: This project is part of the Joint Tactical Communications (TRI-TAC) Program. Tasking for the development and initial procurement of TRI-TAC equipments has been assigned to the Services and National Security Agency (NSA). The Army related projects in Program Element 2.80.10.A are: D110 - Mobile Subscriber Equipment; D111 - Digital Group Multiplexer

Project: #D104 | Title: Joint Tactical Communications (TRI-TAC) Office
Program Element: #2.80.10.A | Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications | Budget Activity: #4 - Tactical Programs

Family; D114 - Other Services assigned TRI-TAC Tasks; D222 - Automatic Communications Central Office AN/TTC-39; D172 - Net Radio Interface; D178 - Joint Test Support; D116 - Facility Support Element (FSE); D117 - Short Range Wideband Radio (SRWBR) Assemblages; and D119 - Modular Record Traffic Terminal (MRTT); and in Program Element 3.31.42.A, Satellite Communications Ground Environment, under D456 - Tactical Satellite Communications Systems (TACSATCOM). The Other Services/NSA related efforts are as follows:

Air Force (PE 2.80.10.F)	Navy (PE 2.80.10.N)	NSA (PE 3.34.01.G - Comm Security Equipment)
Technical Communications Control Facilities (TCCF)	Tactical Digital Facsimile (TDF) AN/UXC-4	TENLEY Communications Security (COMSEC)
Digital Tropospheric Scatter Radio Terminal (TROPO) AN/TRC-170V( )	Ultra High Frequency (UHF) Satellite Modem	SEELEY Communications Security (COMSEC)
Data Adapter (DA), MX-9810 and MX-9811	Advanced Narrowband Digital Voice Terminal (ANDVT)	SELDON Communications Security (COMSEC)
Digital Non-Secure Voice Terminal (DNVT), TA-954	Joint Test Element (JTE) Support	ANDVT - Communications Security (COMSEC)
Short Range Wideband Radio (SRWBR)	Marine Corps (PE 2.80.10.M)	Joint Test Element (JTE) Support
Joint Test Element (JTE) Support	Unit Level Switch (ULS) Family, AN/TTC-42V( ) & SB-3865	
	Joint Test Element (JTE) Support	

C. WORK PERFORMED BY: TRI-TAC Office, Fort Monmouth, NJ. Supporting contractor effort is performed by Booz Allen Public Administration Service, Inc., Tinton Falls, NJ.

Project: #D104
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The Joint Tactical Communications (TRI-TAC) Office was officially established by the Secretary of Defense and became effective on 1 July 1971. The development of a Joint Service specification for the TRI-TAC Switch (AN/TTC-39) including the related Communications Security (COMSEC) equipment was completed and validation contracts were awarded by Project Manager, Army Tactical Communications Systems and National Security Agency (NSA). A joint test facility was established for testing of the AN/TTC-39 and related COMSEC. The Joint Tactical Communications Master Plan, Land Based Switched System Plan, Naval Switched Subsystem, Transitional Plan, Subsystem Plans, and Test plans were prepared and distributed to all program participants by the TRI-TAC Office. In April 1974 engineering development of the AN/TTC-39 was approved. Contracts for full scale development of the AN/TTC-39 and the related COMSEC equipment were awarded by the Army and NSA respectively. The Air Force awarded a contract in May 1975 for development of the Technical Control Facility and the Army awarded a FY75 engineering development contract for a family of Digital Group Multiplexers (DGM). The TRI-TAC Office revised plans including Aspect Papers, Architecture documents and continued efforts in areas of Interoperability and Interface Control, Logistics and Data Management and Test Planning Activities. Activities related to program review and configuration control as well as Program Budget Reviews including issuance of a Program/Budget Guide were accomplished. The Air Force awarded contracts in FY76 for the full scale development (FSD) of the Digital Tropospheric Scatter Radio Terminals and advanced development of the Digital Non-Secure Voice Terminal. The Navy awarded a contract in Sep 1976 for the FSD phase of the Ultra High Frequency (UHF)-Demand Assigned Time Division Multiple Access (TDMA) Satellite Modems. DOD Directive 5148.7 was revised by the Deputy Secreatry of Defense (DEPSECDEF) in February 1976 and assigned Director, TRI-TAC increased responsibilities for coordinating the conduct, planning and reporting of Joint Testing of TRI-TAC developed equipments. By Memorandum dated 12 March 1976, the DEPSECDEF established the Joint Test Facility and Organization for the TRI-TAC Program. DOD Instruction 5148.8, 9 April 1976, provided implementing instructions to the participating Services/DOD Agencies and amplified responsibilities of the TRI-TAC Office in Joint Test and Evaluation of TRI-TAC Equipment. Major efforts of the TRI-TAC Office included the overall coordination and evaluation of all equipments under development including interoperability, interface and configuration control. On 26 August 1976, the Director, TRI-TAC Office was designated the Executive Agent for development of the Advanced Narrowband Digital Voice Terminals (ANDVT) for securing narrowband radio and telephone circuits. The TRI-TAC Program/Budget Guide was revised in February 1977 and the TRI-TAC Test and Evaluation Plan (TEMP) was revised and forwarded to the Secretary of Defense in May 1977. A draft Program Management Plan (PMP) was prepared and coordinated with the Services and participating DOD agencies in August 1977. Bi-monthly program status reviews were conducted along with a separate Logistics Status Review and Joint Testing Review during FY 1977. Numerous performance and interface specifications and Interface Control Documents were prepared, revised and issued in 1977. The TRI-TAC Office also participated in the source evaluation and selection process for the Tactical Digital Facsimile (TDF) and the Unit Level Circuit Switch (ULCS) engineering development contracts awarded by the developing service. Primary efforts during 1978 have been in evaluating contractor performance during full scale development (FSD) phase of the AN/TYC-39 Family of Switches;

TENLEY/SEELEY COMSEC Equipments, Communications Nodal Control Elements (CNCE), Digital Group Multiplexer (DGM) family, Digital Tropo AN/TRC-170, Tactical Digital Facsimile (TDF) and the Unit Level Circuit Switch (ULCS) family. In addition, the validation phase efforts of the Communications Systems Control Element (CSCE) and Super High Frequency (SHF) Satellite Modem have been monitored. The TRI-TAC Office has participated in the selection process for the Digital Net Radio Interface (NRI), Modular Record Traffic Terminal (MRTT), Digital Non-Secure Voice Terminal (DNVT), and the Short Range Wideband Radio Modifications to the AN/GRC-144 Radio Set Contract Awards. They have participated in the Mobile Subscriber Equipment (MSE) Special Task Force Effort. The Program Management Plan (PMP) has been revised and published on 31 July 1978. The TRI-TAC Office has provided overall management and coordination for the completion of the Joint Test Facility. The TRI-TAC Office has provided management and guidance for the start of the Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYC-39 Message Switch, CNCE, DGM family and TENLEY/SEELEY Communications Security (COMSEC) programs.

2. FY 1979 Program: Continue overall management for the test, evaluation and system architecture aspects of the TRI-TAC program. Continue preparation of specifications, coordination and monitoring of Services/National Security Agency (NSA) efforts, monitoring and evaluating contractor performance, management of the Joint Test Organization, management of interface and configuration control and providing overall program guidance. Increase in FY 1979 funding over FY 1978 is due primarily to the increased level of joint testing on TRI-TAC equipments at Fort Huachuca, AZ. The TRI-TAC Office will monitor the DTE/IOTE progress on the AN/TTC-39 Circuit Switch, AN/TYC-39 Message Switch, CNCE, TENLEY/SEELEY COMSEC, DGM family and Digital Tropo AN/TRC-170.

3. FY 1980 Planned Program: Continue overall management for the test, evaluation and system architectural aspects of the TRI-TAC Program. The resources under this project will continue to support the operation of the TRI-TAC Office, to include civilian salaries, operating expenses and support contract(s) in the accomplishment of the assigned mission prescribed by DOD Directive 5148.7. DTE/IOTE will be in progress on the AN/TTC-39 Circuit Switch, CNCE, TENLEY/SEELEY COMSEC, DGM family, Tactical Digital Tropo Terminal (AN/TRC-170), Short Range Wideband Radio (SRWBR), NRI Equipment.

4. FY 1981 Planned Program: Continue overall management for the test, evaluation and system architectural aspects of the TRI-TAC Program. These resources include the support of the TRI-TAC Office to include civilian salaries, operating expenses, and support contract(s) in the accomplishment of the assigned mission. Slight increase in FY 1981 funding over 1980 funding is due primarily to the increased level of joint testing on TRI-TAC equipments at Fort Huachuca, AZ. DTE/IOTE will be in progress on the ULCS, the Data Adapter, the DNVT, NRI, and the MRTT.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

Project: #D104
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5873	5996	6100	6205	Continuing	Not Applicable
Funds (as shown in FY 1979 submission	5911	5996	6100	-	Continuing	Not Applicable
Quantities (current requirements)						*
Quantities (as shown in FY 1979 submission)						*

Other Appropriations: Not Applicable.

* No hardware or software quantities are included in this project.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D119 — Title: Modular Record Traffic Terminal (MRTT)
Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Modular Record Traffic Terminal (MRTT) family is a set of secure, ruggedized, tailorable tactical record traffic terminal equipments and assemblages designed to provide facilities to compose, edit, process, transmit, receive, and distribute record traffic required by combat operations and combat operations support. Two levels of employment are planned; Single Subscriber Terminals (SST) and Tactical Communications Centers (TCC). The SST consist of individual equipment items configured as terminals to meet the requirements of individual end-users. The TCC will assemble varying numbers of SST equipments into a cluster arrangement within a processor controlled tactical message center environment. The MRTT family is needed to replace the obsolete, low speed, unreliable, manpower intensive, electro-mechanical teletypewriters, paper tape punches and tape readers employed as individual terminal equipments at battalion, brigade and division level and in teletypewriter and message center assemblages (AN/MSC-29, AN/MSC-17 and AN/GSQ-80A) employed at brigade, division, and Corps levels. The MRTT family represents the users terminal equipment in the tactical record traffic system. SST's and TCC's are interconnected thru the AN/TYC-39 Automatic Message Switch and/or the AN/TTC-39 Automatic Circuit Switch which are also Army assigned TRI-TAC programs under Project D222 (Automatic Communications Central Office AN/TTC-39). The MRTT family will provide a direct user to user terminal capability (SST) for high volume subscribers that will eliminate the slow response time due to multiple reformating written messages and preparation of punched paper tapes for transmission. Low volume subscribers will be served thru the common user TCC located at major headquarters (i.e. Division, Brigade) or other concentrations of low volume users. The TCC will provide service thru the AN/TYC-39 switch direct to other TCC's or SST's and will eliminate the slow response time due to the punched paper tapes used in the current transmission of message traffic. The planned program will be essentially an assemblage task addressing software/interfaces and interoperability requirements with minimal hardware engineering development required. Maximum utilization is to be made of existing militarized hardware items (i.e., AN/UGC-74 Teletypewriter Terminal) and available state-of-the-art commercial equipments. The MRTT program is an outgrowth and includes the requirements of the TRI-TAC Composition and Editing Display (COED) program initially assigned to the Air Force. The Office of the Secretary of Defense (OSD) cancelled the Air Force assigned COED program in February 1976, directed a MRTT study by the TRI-TAC Office and finally assigned the MRTT development program to the Army in May 1977. The Phase I Study Program was initiated in May 1976 and is scheduled for completion in December 1977.

B. RELATED ACTIVITIES: All Services and the National Security Agency (NSA) are participating in the development of the Modular Record Traffic Terminal (MRTT) through their respective TRI-TAC programs. Development efforts within the Army related to the MRTT program are conducted in Program Element 2.80.10.A under Project D110 - Mobile Subscriber Equipment (MSE); D111 - Digital Group Multiplexer (DGM) family; D114 - Other Service assigned TRI-TAC programs; D116 - Facility Support Element; D117 - Short Range Wideband Radio Assemblages; D172 - Net Radio Interface (NRI); D178 - Joint Test Element Support; D222 - Automatic Communications Central Office AN/TTC-39 family; and D104 - Support to the TRI-TAC Office per DOD Directive 5148.7; and in Program Element 3.31.42.A, Satellite Communications Ground Environment, under D456 - Tactical Satellite Communications Systems (TACSATCOM). These related programs do not duplicate MRTT developments. They represent other elements of the Army's Integrated Tactical Communications System (INTACS) that must be interoperable with MRTT to insure a viable and integrated program.

Project: #D119
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Modular Record Traffic Terminal (MRTT)
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

C. WORK PERFORMED BY: Project Manager, Multi-Service Communication Systems; Project Manager, Army Tactical Communications Systems (ATACS); US Army Communications Research and Development Command; and the TRI-TAC Office, all located at Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Army has participated in the TRI-TAC MRTT Study Program since April 1976. MRTT task was formally transferred to the Army on 10 May 1977 by the Office of the Secretary of Defense (OSD). The results of the TRI-TAC MRTT Study have provided the basis for the Joint Service Operational Requirement which was prepared and forwarded for approval, the draft equipment/system specifications which are being coordinated and will be the basis for the procurement data package (PDP). A Determination and Findings (D&F) and a Procurement Plan were drafted and have been forwarded for approval in FY 1979. A Materiel Systems Requirement Specification (MSRS) has been completed and will be the basis for the preparation of a Baseline Cost Estimate.

2. FY 1979 Program: Complete and obtain approval of D&F, Procurement Plan, Procurement Data Package, and Baseline Cost Estimate. Solicit and award Full Scale Engineering Development (FSED) contract for SST design and fabrication of engineering development models for use in Development Test and Evaluation (DTE) and Initial Operational Test and Evaluation (IOTE). Monitor and evaluate contractor performance and participate in preliminary and final design reviews. Initiate planning for DTE/IOTE. Increase in FY 1979 funding over FY 1978 is due to award of the FSED contract.

3. FY 1980 Planned Program: Award FSED contract for MTCC for DTE/IOTE models. Complete engineering and fabrication efforts on SST and continue to monitor and evaluate the contractor performance on the SST contract. Complete planning and preparation for start of DTE/IOTE.

4. FY 1981 Planned Program: Complete MTCC FSED. Complete PQT's for SST and MTCC. Complete Formal Qualification Tests (FQT's) for software. Complete DTE/IOTE of SST, conduct Development Acceptance In-Process Review (DEVA-IPR), type classify and prepare for initial production contract award. Start DTE/IOTE for both SST and MTCC.

5. Program to Completion: Complete DTE/IOTE of MTCC and conduct DEVA-IPR, type classify, and prepare for initial production contract. Award initial production contracts for SST and MTCC.

6. Major Milestones: Not Applicable.

Project: #D119 — Title: Modular Record Traffic Terminal (MRTT)

Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program

DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	574	6000	9000	3300	3800	22674
Funds (as shown in FY 1979 submission)	574	6000	10500	--	3600	20674
Quantities *						

Other Appropriations: Not applicable.

FY 1981 Estimate column and the current Total Estimated Cost column have been increased due to a revised cost estimate on software/controller and MTCC equipment development for this program. The FY 1980 Estimate has been decreased, since this funding, per revised cost estimates and revised program schedule will not be able to be obligated until FY 1981.

* Various small quantities of existing militarized terminal equipments and available commercial terminal equipments.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D222 — Title: Automatic Communications Central Office, AN/TTC-39
Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The AN/TTC-39 is a family of modular and transportable communications switching systems designed to provide secure, automatic, processor controlled switching for tactical voice and message traffic. The family consists of hybrid (analog and digital) circuit switches (AN/TTC-39) varying in nominal size from 450 (300 line) to 750 terminations (600 line) by increments of 150 analog or digital terminations, and message switches (AN/TYC-39) equipped for 50 lines. Circuit switches can be grouped to provide up to 3000 terminations (2400 lines) and the message switch can be employed either with or independent of the circuit switch. The AN/TTC-39 family is planned for multiservice use: from Corps level back thru Theater Army; at Tactical Air Base, Special Headquarters elements of the Tactical Air Control System, Air Force Components and Joint Task Force Headquarters and other concentrations of forces and Emergency Action forces; by Marine Division/Wing and Marine Air Ground Task Forces of Marine Amphibious Brigade size or larger; and within the Defense Communications System. The AN/TTC-39 family is needed to replace the following inventory switches: obsolete, predominately manual, manpower intensive telephone central offices (i.e., AN/MTC-1, AN/MTC-9, and AN/TTC-22); obsolete, manpower intensive, electromechanical automatic telephone central offices (i.e., AN/TTC-28); interim processor controlled automatic central offices (i.e., AN/TTC-25, AN/TTC-30 and AN/TTC-38); and obsolete, manpower intensive, manual record traffic (messages) central offices and relays (i.e., AN/MGC-19, AN/MSC-29, AN/TSC-58, AN/MGC-9, AN/MGC-32, AN/MGC-23, AN/MGC-22 and AN/MYQ-2). The AN/TTC-39 family provides the transition from the current inventory analog switching systems (manual and interim automatic) to a digital system which provides improved reliability/availability and reduced life cycle cost thru solid state technology, provides capability for end to end security thru digital techniques and reduces manpower requirements for operation and maintenance thru automation and digital technology. Automation of the message switch also eliminates the manpower intensive, slow, error prone manual punched paper tape methods of transmitting and switching message traffic. The AN/TTC-39 family is the heart and lead development item of the Joint Tactical Communications (TRI-TAC) Program. The TRI-TAC program is a joint Service and Defense Agency, program to develop and field a family of securable, digital, mobile/transportable trunking, access and switching equipments to satisfy the Services' tactical multichannel switched communications systems requirements in the early 1980's. It will be interoperable with the Defense Communications System (DCS) and interface with systems of our allies. Overall management is provided by the Office of the Secretary of Defense (OSD) thru the Director, TRI-TAC Office. Each Service/Defense Agency is tasked by OSD to develop various elements of the TRI-TAC system architecture. The tasked Service/Agency totally funds the R&D phase and acts as the procuring Service for all DoD quantities in the production phase. Test and Evaluation is managed by the Director, TRI-TAC Office thru a Joint Test Element that is funded by each Service/Agency on a pro-rata basis. The AN/TTC-39 family development was assigned to the Army by OSD in January 1972. The Advanced Development phase was completed in March 1974.

B. RELATED ACTIVITIES: All Services, the Defense Communications Agency, and the National Security Agency are participating in the development of AN/TTC-39 family of switches. Development efforts within the Army related to the program are conducted in Program Element 2.80.10.A under project D111 - Digital Group Multiplexers; D110 - Mobile Subscriber Equipment; D117 -

Short Range Wideband Radio (SRWBR) Assemblages; and D119 - Modular Record Traffic Terminal (MRTT); and Program Element 3.31.42.A, Satellite Communications Ground Environment under project D456 - Tactical Satellite Communications Systems (TACSATCOM). In addition, there are a number of TRI-TAC Tasks assigned to the other Services related to the AN/TTC-39. The Army program to monitor these other service efforts is project D114 - Other Service Assigned TRI-TAC Tasks. The TRI-TAC Office coordinates and provides overall managements for all Service efforts and is funded by the Army under D104 per DOD Directive 5148.7. The Army's share (35%) of the TRI-TAC Joint Test Element is funded in project D178 (Joint Test Support) per DOD Instruction 5148.8. Project D116 - Facility Support Element funds the Army support to the TRI-TAC Joint Test Program with a baseline of current inventory equipment per DOD Instruction 5148.8. Centralized management by the Office of the Secretary of Defense (OSD) thru the TRI-TAC Office insures that there is no duplication of effort in the related Army, other Service assigned and DoD Agency assigned TRI-TAC programs.

C. WORK PERFORMED BY: Project Manager, Multi-Service Communications System; US Army Communications Research and Development Command; and TRI-TAC Office; all of Fort Monmouth, NJ. Contractor is GTE-Sylvania, Needham Heights, MA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Hardware development was initiated in FY 1972, when a first draft of the Automatic Communications Central Office, AN/TTC-39 specification was developed, a final Joint Service Specification was approved and two competitive prototype contracts for Advanced Development (Phase I) were awarded. Advanced Development of the AN/TTC-39 continued in 1973 during which time the competitive prototype contracts were monitored against the prototype model design plans submitted by the contractors. Data required for the Engineering Development (Phase II) contract to be awarded to the winner of Phase I was coordinated with the Services and agencies. The Coordinated Test Program was reviewed, and guidance for the Phase II proposal was developed. The Army was tasked to develop the Digital Group Multiplexer (DGM) family which is associated with the AN/TTC-39 switch. A Defense Systems Acquisition Review Council (DSARC) II was held on 11 April 1974 and Full Scale Development (FSD) was approved by the Deputy Secretary of Defense on 12 April 1974. A Cost Plus Incentive Fee (CPIF) contract was awarded to GTE Sylvania on 16 April 1974. The Preliminary Design Review of the Full Scale Development (FSD) was held in September 1974. In December 1974, the contractor announced a cost growth of $23 million which was subsequently negotiated to reflect a $19.1 million cost growth and a $4.1 million change in scope. Through a series of TRI-TAC approved trade-off proposals in May of 1975, the proposals were incorporated into the contract baseline at a not-to-exceed cost of $835 thousands. The resultant Engineering Change Proposals caused a two month slippage in milestones starting with the Final Design Review. During November 1975, there were indications that the contractor was falling behind schedule because of problems in the completion of specifications and development of circuit switch software. At the Final Design Review held December 1975, the contractor identified a schedule slippage of 3 1/2 months. In order to provide the contractor with some time to resolve software problems, as well as to better align Government testing of the AN/TTC-39 with the US Air Force developed Tactical Communications Control Facility (TCCF) Program,

the TRI-TAC Office authorized a 3 1/2 month extension of the program. A Government study of the software problem concluded that there existed a potentially large slip in the program schedule. The contractor also confirmed a January 1976 Government conclusion that cost growth was occurring that was not being reported. During May 1976, the contractor submitted an estimate of $105.2M as the cost at completion against the schedule presented at the December 1975 Final Design Review. Government analysis of this estimate resulted in a conclusion that a breach of the Decision Coordinating Paper (DCP) #135 cost and schedule thresholds was to be anticipated. In June 1976, the Project Manager recommended a review of the development program by Defense Systems Acquisition Review Council (DSARC) principals. The contractor's funding requirements submitted in May 1976 for FY 1977 and FY 1978 exceeded available program funding. During August 1976, the contractor was directed to implement a plan which minimized government exposure to further cost growth, pending a decision on the future of the development program. The directed action constrained the development effort through FY 1977 within a cumulative funding cap of $100.5 million. A Special DSARC was conducted on 2 November 1976 and approved program continuation on a revised cost and schedule baseline (16 month circuit switch extension). DoD directed updates of life cycle costs were completed in May 1977. Department of the Army (DA) approved cost goals and a revised TRI-TAC acquisition strategy were proposed in a DCP Cover Sheet Revision forwarded to the Office of the Secretary of Defense (OSD) in April 1978 for final review and approval. Major milestones attained during FY78 were the completion of Contractor Development test and the ahead of schedule start of Government development test of the AN/TYC-39 message switch. A training configuration of the AN/TYC-39 was delivered to the US Army Signal School where the first Government conducted training of military personnel began in August 1978. Contractor efforts continued in the development test of the AN/TTC-39 circuit switch, interface development with other service managed TRI-TAC equipments now in development and development of diagnostic software.

2. FY 1979 Planned Program: Complete Development Test and Evaluation/Initial Operation Test and Evaluation (DTE/IOTE) for the AN/TYC-39 Message Switch. Complete Prototype Qualification Test (PQT) and start DTE/IOTE for the Circuit Switch. Continue development of software and continue development required for interface with other TRI-TAC equipments managed by other services. Decrease in funds in FY 1979 compared to FY 1978 due primarily to completion of circuit switch engineering, assembly and PQT. Prepare for the scheduled October 1979 DSARC III, production Decision Milestone.

3. FY 1980 Planned Program: Complete DTE/IOTE on the AN/TTC-39 Circuit Switch, prepare for and conduct the DSARC III production decision. Award initial production contract for the AN/TYC-39 Message Switch. Complete Type Classification action for the AN/TTC-39. Continue development of software required for interface with other TRI-TAC equipments managed by other services. Continue contractor support of AN/TTC-39 and AN/TYC-39 models in the TRI-TAC Joint Test Facility used to support joint test of other TRI-TAC development programs.

4. FY 1981 Planned Program: Complete other TRI-TAC equipment interface software. Continue contractor support of AN/TTC-39 and AN/TYC-39 models in the TRI-TAC Joint Test Facility used to support joint test of other TRI-TAC development programs.

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

5. Program to Completion: Award initial production contract (FY 1982) for AN/TTC-39 Circuit Switch and remaining AN/TYC-39 Message Switches. Conduct Production Acceptance Test and Evaluation (PATE). Prepare for and field initial circuit and message switches to complete Initial Operational Capability (IOC).

6. Major Milestones:

Major Milestones	Current Milestone Dates*	Milestone Dates Shown in FY 1979 Submission
Engineering Development Contract Award	Apr 74	Apr 74
Prototype Qualification Test (PQT)		
Start Message Switch/Circuit Switch	May 77/Mar 78	May 77/Mar 78
Complete Message Switch/Circuit Switch	Apr 78/Nov 78	Apr 78/Nov 78
Development Test and Evaluation/Initial Operation Test and Evaluation (DTE/IOTE)		
Start Message Switch/Circuit Switch	Jul 78/Feb 79	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	May 79/Nov 79	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC) III AN/TYC-39 Message Switch Production Decision	Oct 79	Oct 79
AN/TYC-39 Production Award	Nov 79	Nov 79
DSARC IIIA AN/TTC-39 Production Continuation Decision	Sep 80	Sep 80
AN/TTC-39 Production Award	Oct 81	Oct 81
Initial Operational Capability (IOC)	Jun 82	Jun 82

* Alternative C, Decision Coordinating Paper (DCP) *135, Cover Sheet update, dated 14 April 1978.

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	36392	28300	27000	9600	11800	227600
Funds (as shown in FY 1979 submission)	36510	28300	9700	-	1536	215800
Quantities (current requirements)	4	6	6	0	0	16**
Quantities (as shown in FY 1979 submission)	7	9	0	0	0	16

Other Appropriations:

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	0	0	39900	-	222300	262200
Funds (as shown in FY 1979 submission)	0	0	27900	-	269200	297100
Quantities (current requirements)	0	0	16	-	116	132***
Quantities (as shown in FY 1979 submission)		0	12	-	120	132***

As a result of a special DSARC in Nov 1976, The Office of the Secretary of Defense (OSD) directed a revised acquisition strategy which required an increase in procurement quantities and a revised cost estimate which identified a required increase in funding levels. This increase in funds and quantities is reflected in the RDTE profile for FY 1980 estimate, The Other Procurement, Army. The current total estimated cost has been decreased to reflect the funding levels in the revised baseline cost estimate (BCE) which includes the current inflation escalation factors.

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

** Engineering Development models include 7 AN/TYC-39 and 9 AN/TTC-39 switches.
*** Total Army quantity of 132 represents 95 AN/TTC-39 (300 line), 8 AN/TTC-39 (600 line) circuit switches, and 29 AN/TYC-39 message switches.

E. TEST AND EVALUATION DATA:

1. Development Test and Evaluation: The contractor for the AN/TTC-39 family of modular, secure, digital processor controlled, automatic circuit (AN/TTC-39) and message (AN/TYC-39) switches is GTE Sylvania, Needham Heights, MA. A combined Development Test and Evaluation (DTE) on the AN/TTC-39 Circuit Switch is scheduled for February 1979 - May 1979. The combined DTE on the AN/TYC-39 Message Switch began in June 1978 and will continue to February 1979. To date, 28 of the 60 subtests which comprise the Development Test phase, have been completed. The AN/TYC-39 Message Switch has performed with excellent results and has incurred no major problems. The Engineering Development equipment to be tested will be essentially the same as the production models although the circuit switch modularity may vary according to specific employment of production equipment. A revised TRI-TAC Test and Evaluation Master Plan (TEMP) was prepared by the Director, TRI-TAC Office, and was submitted to the Office of the Secretary of Defense on 4 May 1977. The operational/technical performance characteristics listed below in paragraph 3 have been derived from the government-witnessed Contractor Development Testing (CDT). DTE/IOTE performance characteristics will be available once these phases are completed.

2. Operational Test and Evaluation: To date, no operational tests have been conducted on the AN/TTC-39 family of switches. A combined Operational Test and Evaluation (OTE) for the AN/TTC-39 Circuit Switch is scheduled for July 1979-November 1979 and the combined OTE for the AN/TYC-39 Message Switch will be conducted from February 1979-May 1979. Initial Operational Test and Evaluation (IOTE) on the AN/TTC-39 and AN/TYC-39 is scheduled to be accomplished prior to production contract awards. It is expected that the Engineering Development Equipment to be tested will be essentially the same as the production models although the circuit switch modularity may vary according to specific employment of production equipment. IOTE for the AN/TTC-39 family of switches will be conducted by the US Army Operational Test and Evaluation Agency (OTEA) with support of the TRI-TAC Joint Test Organization at Fort Huachuca, AZ. Test will use military personnel from the appropriate elements of a Command Operations Signal Battalion, a Corps Area Signal Battalion, and a Radio and Cable Battalion. Contractor support will continue during testing. One of the major objectives during operational testing is to provide information to assess the reliability, availability, and maintainability (RAM) and the operational impact of RAM performance.

3. System Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
AN/TTC-39 Circuit Switch (600 Line/300 Line)		
Inherent Availability	.9999/.999	0.9995/0.994
Mean Time Between Failure	2500/250 hours	2500/250 hours
Mean Time to Repair	15 minutes	15/15 minutes
Simultaneous Conferences	6/4	6/4

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office AN/TTC-39
Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

Maximum Conferees per Conference	20	20/20
Alternate Routing	Up to 5	Up to 5/5
Standby Battery Power	15 minutes	15/15 minutes
Terminations per Module	150	192/192
Maximum Weight per Shelter	7000 lbs	7180/8300 lbs

	Objective	Demonstrated Performance
AN/TYC-39 Message Switch (50 Line)		
Inherent Availability	.9999	0.9997
Mean Time Between Failure	2500 hours	2500 hours
Mean Time to Repair	15 minutes	15 minutes
Reference Storage	10 days	10 days
Journal Storage	30 days	30 days
Standby Battery Power	15 minutes	15 minutes
Message Processing Time	2 seconds	2 seconds
Throughput Characters per Second	9000	9000
Bit Error Rate per Consecutive Bits	1 per 10^{10}	1 per 10^{10}
Maximum Weight per Shelter	7000 lbs	6742 lbs

1/ These demonstrated performance characteristics have been derived from the government-witnessed Contractor Development Testing (CDT). Development Test and Evaluation/Operational Test and Evaluation (DTE/OTE) performance figures will be available at the completion of DTE/OTE.

INTELLIGENCE AND
COMMUNICATIONS

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.11.A
DoD Mission Area: #524 - Base Communications

Title: Strategic Communications (STARCOM)
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	299	1000	500	550	Continuing	Not Applicable
D481	Strategic Communications (STARCOM)	299	1000	500	550	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for developmental efforts for non-tactical telecommunications networks, services, facility controls and associated equipment which the Army operates or has operational responsibility for and are not identifiable as Defense Communication System (DCS). The equipments and systems are for worldwide deployment in fixed Army Base environments and support command and control communications, post, camp, and station level interoperability with the DCS and electromagnetic monitoring devices for special ammunition storage sites.

C. BASIS FOR FY 1980 RDTE REQUEST: To award contract for Electromagnetic Hazards monitoring devices for performance test and evaluation at critical storage and maintenance sites. Continue evaluation of the present commercial technology of alternate and unattended power sources and obtain candidates for evaluation. Initiate investigation to establish a baseline for potential application of distributed microprocessor for Army requirements and begin developmental effort for a low cost, high speed micro-programable processing capability to improve the low and high speed data handling and transmission facilities.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	299	1000	1000	Continuing	Not Applicable

Program Element 6.47.01.A/D481, (Combat Support Communications) was changed to Program Element 3.31.11.A/D481, (Global Communications) for the FY 1980 budget submission to realign the program into a more appropriate mission area and budget activity. Current Army TOA constraints do not permit complete FY 1980 program funding as previously submitted.

E. OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

Program Element: #3.31.11.A
DoD Mission Area: #524 - Base Communications

Title: Strategic Communications (STARCOM)
Budget Activity: #5 - Intelligence and Communications

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop non-tactical communications concepts equipment, and systems in response to requirements identified by the US Army Communications Command. The equipment and systems are for worldwide deployment in fixed Army Base environments. Maximum use is made of commercially developed equipment and technology for test and evaluation of equipment available from the US and foreign communications industry to determine its capability to satisfy Army needs and for the development of equipment for Army unique requirements which cannot be satisfied by commercially available equipment. Specific tasks include the Communications Emergency Action Console, Transportable Automated Electromagnetic Console (EMC) Measuring System, Electromagnetic Radiation Hazards Monitoring Systems and evaluation of commercially developed techniques.

G. RELATED ACTIVITIES: None.

H. WORKED PERFORMED BY: Project Manager DCS (Army) Communications System and US Army Communications Research and Development Command, Fort Monmouth, NJ. Contractors include: Institute of Telecommunications Sciences, Boulder, CO; and National Bureau of Standards, Boulder, CO.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Conducted a special In-Process Review (IPR) on Communications Emergency Action Consoles, completed RDTE, and transitioned to Other Procurement, Army (OPA) funding. Developed design modifications to extend the capabilities of some commercial equipment used in Transportable Automatic Electromagnetic Measuring System (TAEMS); to provide an increased range in measuring ability, obtained Letter Requirement (LR) approval and initiated advanced development of an Electromagnetic Radiation Hazards Monitoring System urgently needed for special ammunition storage sites to provide timely warning of electromagnetic hazards and preclude premature activation of the ammunition.

2. FY 1979 Program: Complete the design and test of modifications to commercial components of Transportable Automatic Electromagentic Measuring System (TAEMS), evaluate breadboard models of Electromagnetic Radiation (EMR) Hazards Monitoring Systems, and begin preparation of specifications for acquisition of Engineering Development Models, Integrated Logistics Support (ILS), and Producibility Engineering Package (PEP).

3. FY 1980 Planned Program: Award contract for EMR Hazards Monitoring System Engineering Development Models, ILS and PEP, survey commercial availability of alternative and unattended power sources and procure candidates for evaluation; obtain commercial 16/32 Kbps multiplexers for evaluation; survey industry to establish a baseline for potential application of distributed microprocessor to Army requirements; begin developing a low cost, high speed micro-programmable processing capability to enhance the low end high speed data handling and transmission facilities, begin investigating the potential use of 15 GHz radios as potential replacements in short range radio links and as substitutes for land line systems to upgrade and increase post, camp, and station telecommunications capability and interoperability with the Defense Communication System (DCS).

Program Element: #3.31.11.A
DoD Mission Area: #524 - Base Communications

Title: Strategic Communications (STARCOM)
Budget Activity: #5 - Intelligence and Communications

4. FY 1981 Planned Program: Fabricate Electromagnetic Radiation (EMR) Hazards Monitoring System Engineering Development Models, develop Integrated Logistics Support (ILS) and Producibility Engineering Package (PEP). Continue evaluation of commercial technology in alternate and unattended power sources, and 16/32 Kbps multiplexers for potential application to meet Army requirements; perform trade-off analyses and develop alternative approaches to satisfying requirements for low cost, high speed microprogrammable processors, assess performance and employment concepts and perform trade-off analysis pertaining to potential uses for 15GHz radios.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.26.A
DoD Mission Area: #523 - Long Haul Communications

Title: Long Haul Communication (DCS)
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2018	5850	2600	7240	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D149	Army Support for DCS (Defense Communication System)	2018	5850	2600	7240	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for development of Communications Systems and Equipments for the Defense Communication System (DCS) which are assigned to the Army by the Defense Communication Agency. The equipments and systems are to be deployed worldwide in field non-tactical DCS facilities. Maximum use is made of commercially developed technology with RDTE funding to test and evaluate non-tactical communications equipment available from industry. Major efforts include switched subsystems and transmission subsystems. Emphasis is directed toward converting the DCS to an all digital network.

C. BASIS FOR FY 1980 RDTE REQUEST: Continue the Digital Troposcatter Improvement Program for the Digital European Backbone (DEB) System to improve the European Communications Network. Initiate contract award for the Access Area Digital Switching System (AADSS) concept formulation. Prepare a functional specification and statement of work for a concept development for the Interservice Automatic Message Processing Equipment (I/S AMPE). This effort is in support of the planned Integrated Autodin System for the period 1978 to 1990.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	4029	1300	1535	Continuing	Not Applicable

Program Element: #3.31.26.A
DoD Mission Area: #523 - Long Haul Communications

Title: Long Haul Communication (DCS)
Budget Activity: #5 - Intelligence and Communications

The primary change from the FY 1979 submission is the restructuring of the program element to transfer Project D245 (Strategic Communications Development) to Program Element 3.31.26.A (Long Haul Communications (DCS)). The restructuring took place to realign this strategic communications project to Program Elements in Budget Activity 5 to correct a minor inconsistency in Budget Activities and DOD/Mission Areas. The decrease in FY 1978 funds was due to redirection guidance for the Access Area Digital Switching System. The increase in FY 1979 and FY 1980 is due to reprograming action to support AUTOSEVOCOM II and the transfer of Project 245 funds to Program Element 3.31.26.A mentioned above.

E. OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: #3.31.26.A
DoD Mission Area: #523 - Long Haul Communications

Title: Long Haul Communication (DCS)
Budget Activity: #5 - Intelligence and Communications

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop non-tactical communications concepts, hardware, software, and systems to be used by the Army, Navy, and Air Force in the Defense Communications Systems in response to requirements identified by, and tasked to the Army, by the Defense Communications Agency (DCA). The equipments and systems are to be deployed worldwide in fixed non-tactical Defense Communications Systems (DCS) facilities. Maximum use is made of commercially developed technology with RDTE funding required to test and evaluate non-tactical communications equipment available from US and foreign industry and to develop equipment required to satisfy unique military requirements. Specific tasks include Washington Area Secure High Speed Facsimile, Digital Tropospheric Scatter Improvements, Future DCS Multiplexers, Interservice Automatic Message Processing Equipment (I/S AMPE), Defense Communications System (DCS) Facilities Design, Access Digital Switching System and Automatic Secure Voice Communication II (Autosevocom II).

G. RELATED ACTIVITIES: Program Element 6.47.01.A D245, Strategic Communications Development, provided input to this program from advanced development during FY 1979 and earlier. This program includes both advanced development and engineering development starting in FY 1980 when Project D245 was merged with Project D149, (Army Support for DCS).

H. WORK PERFORMED BY: Project Manager DCS (Army) Communications System, US Army Electronics Research and Development Command, and US Army Communications Research and Development Command, Fort Monmonth, NJ. Contractors include GTE Sylvania, Needham Heights, MA; Signation Inc., Lexington, MA; Institute of Telecommunication Sciences, Boulder, CO; Varian Associates, Palo Alto, CA; DATALOG Division of Litton Industries, Melville, NY; ARINC Research Corporation, Annapolis, MD.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Initiated preparation of procurement package for completion of Engineering Development of the Megabit Digital Troposcatter Modem MD918 in support of the future bandwidth and channel requirements for an all-digital Defense Communication System (DCS); awarded contract for improved klystron tube and began developmental testing; awarded contract for adaptive antenna control advanced development model for troposcatter transmission systems; initiated an evaluation of the feasibility and scope of application of a concept of palletization/modularization of the worldwide communication facilities of the DCS in support of rapid-reaction long haul communications; conducted investigations in access area control signalling; acquired an advanced state-of-the-art commercial telephone switchboard for evaluation to establish a development baseline for Access Area Digital Switching System (AADSS) and support concept formulation; prepared a Statement of Work for Competitive AADSS concept development and validation in support of the future all-digital DCS.

2. FY 1979 Program: Complete preparation of the procurement package and award contract for completion of Engineering Development of the Megabit Digital Troposcatter Modem MD918 to include Integrated Logistics Support (ILS) and Producibility Engineering Package (PEP), deliver three additional improved S-band klystron tubes, complete Developmental Testing (DT) and initiate advanced development of efficient reliable high power amplifiers using the improved S-band klystron tubes; complete testing the adaptive antenna control advanced development model; coordinate the documentation of requirements, prepare

a statement of work and award a contract for the concept definition of an Interservice Automatic Message Processing Equipment (I/S AMPE); complete the evaluation of the feasibility of the palletization/modularization concept; assess capabilities of state-of-art communications processors to accommodate various control signalling alternatives for Access Area Digital Switching System (AADSS), and revise the Statement of Work for AADSS concept formulation and validation, develop an Autosevcom II capability in support of Defense Communications Agency (DCA) based upon current guidance.

3. FY 1980 Planned Program: Continue engineering development of the Megabit Digital Troposcatter Modem to include Integrated Logistic Support (ILS) and a Producability Engineering Package (PEP); monitor contract for development of the efficient reliable high power S-band amplifier; begin engineering development of the adaptive antenna control to include ILS and PEP; complete concept definition contract and preparation of functional specifications for Interservice Automatic Message Processing Equipment (IS AMPE) and prepare a Statement of Work for concept development and validation; conduct a validation In-Process Review (IPR) and prepare a Statement of Work for engineering development of a family of pallets for application to the Defense Communications Systems; award a contract for AADSS concept formulation; continue development of an Autosevocom II capability in support of DCA based upon current guidance.

4. FY 1981 Planned Program: Complete engineering development of the Megabit Digital Troposcatter Modem MD918 including Developmental Testing II/Operational Testing II (DT/OT II). Complete the Developmental Acceptance (DEVA) IPR and award the initial production contract. Deliver, test, and continue engineering development of the efficient reliable high power amplifier; continue engineering development of the adaptive antenna control and begin operational testing; initiate a contract for concept development and validation for an I/S AMPE; award an engineering development contract for a family of pallets for the DCS. Continue contractual effort for AADSS concept formulation; complete development an Autosevocom II capability in support of DCA based upon current guidance.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.42.A
DoD Mission Area: #521 - Satellite Communications

Title: Satellite Communications Ground Environment
Budget Activity: #5 - Intelligence & Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8654	7697	20600	22079	Continuing	Not Applicable
	QUANTITIES						Diverse Items
D253	Defense Satellite Communications System-Defense Communications System (DSCS-DCS) (Phase II)	5864	3663	9000	11300	Continuing	Not Applicable
D450	Satellite Communications	298	0	500	1479	Continuing	Not Applicable
D456	Tactical Satellite Communications (TACSATCOM)	2492	4034	11100	9300	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program includes the development of strategic and tactical satellite communications ground terminals. The Army develops ground terminals for all Services/Agencies. Existing communications facilities that are required to support the strategic and tactical command and control requirements of the National Command Authority and tactical commanders, as well as the Defense Communications System (DCS), do not have the capability nor survivability that is needed. The capability to exercise command and control during all types of situations, and especially in a hostile environment, does not presently exist. Efforts under this program will provide developments that will allow tactical commanders to establish and maintain effective communications to support command and control requirements. These communications will be protected against enemy jamming and will not be limited to line of sight operations; thereby, enhancing command and control during mobile operations on the battlefield.

C. BASIS FOR FY 1980 RDTE REQUEST: (1) Project D253-Defense Satellite Communications System (DSCS): Funding is required to continue the Engineering Development of the Real Time Adaptive Control (RTAC) and to award a development contract for the Satellite Configuration Control Element (SCCE) Retrofit for inclusion of BATSON II communications security equipment. RTAC provides real time control of the DSCS to increase the satellite communications capacity and availability, and provides the necessary degree of responsiveness, survivability, and flexibility, required to monitor and control the expanded capabilities of the DSCS Phase III satellites, which are scheduled for December 1982 launch. RTAC interfaces with the Air Force developed SCCE, which provides command and control of the DSCS III satellites, to enable control of the satellite resource allocations. The retrofit of the SCCE is necessary because the SCCE engineering development models were developed utilizing BATSON I communications security (COMSEC) equipment which has since been replaced by BATSON II.

(2) Project D456-Tactical Satellite Communications (TACSATCOM): Funding is required to continue Engineering Development of the anti-jam capability which is critical for continuous operation of the multichannel initial system during jamming conditions. Funding will provide for initiation of an advanced development effort which will provide a highly jam resistant single channel satellite radio capability for nuclear and critical command and control communications. Funding also supports continuation of the development of the multichannel objective system which was previously funded under Project D113 Joint Tactical Communications Program (Program Element 2.80.10.A). This multichannel effort will, among other things, increase the efficient use of expensive satellite resources by a factor of four. (3) Project D450-Satellite Communications: Initiate develop ment of a 30 GHz transmitter feasibility model that is needed to relieve the Super High Frequency (SHF) spectrum congestion. Continue electromagnetic compatibility analysis of ground mobile forces satellite communication terminals to preclude mutual interference.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	8680	7697	20002	Continuing	Not Applicable

Funding for FY 1980 reflects the increases necessary to support the development of satellite ground equipments necessary to the Defense Satellite Communications System (DSCS) and TACSATCOM systems as authorized in the program plans.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	63700	108000	139600	201100	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	64700	108000	160300	--	Continuing	Not Applicable
Quantities*						

* Large number of diverse items.

Program Element: #3.31.42.A
DoD Mission Area: #521 - Satellite Communications

Title: Satellite Communications Ground Environment
Budget Activity: #5 - Intelligence & Communications

The Defense Satellite Communications System (DSCS) FY 1980 procurement funds have been increased $32.0 million from the FY 1979 submission due to funding for the Satellite terminals and equipment in support of the Worldwide Military Command and Control System (WWMCCS) requirement for a jam resistant secure conferencing capability. The Tactical Satellite Communications (TACSATCOM) FY 1980 procurement funds have been decreased $53.9 million from the FY 1979 submission due to a delay in procuring the multichannel initial system terminals until the latter part of FY 1979; thereby, reducing the total funds required in FY 1980.

Program Element: #3.31.42.A
DoD Mission Area: #521 - Satellite Communications

Title: Satellite Communications Ground Environment
Budget Activity: #5 - Intelligence & Communications

F. DETAILED BACKGROUND AND DESCRIPTION: This program includes the development of strategic and tactical ground terminals for use with satellite communications systems. The two major projects included in this program element (PE) are: The Defense Satellite Communications System (DSCS) Phase II and the Tactical Satellite Communications System (TACSATCOM). Ground terminal requirements for all Services are developed within these projects. Efforts to advance the state-of-the-art in those technological areas necessary to improve ground environment of the DSCS program, and to develop satellite communications equipments suitable for TACSATCOM and other satellite applications, are conducted within the Satellite Communications project D450.

G. RELATED ACTIVITIES: Management of the Army TACSATCOM program is vested in the Project Manager, Satellite Communications, Fort Monmouth, NJ. The Army is responsible for ground terminal development for all Services. The Defense Communications Agency (DCA) is the program manager for the DSCS. In the DSCS, the Army is responsible for development of the ground environment. The Air Force is responsible for the development and launching of the satellites, and the Navy for the development of shipboard terminals.

H. WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ. Contractors include: Comtech Labs, Inc., Smithtown, NJ; Ford-Aerospace & Communications Corp., Palo Alto, CA; Raytheon Company, Sudbury, MA; Magnavox Research Labs, Torrance, CA; RCA, Camden, NJ; Linkabit Corporation, San Diego, CA; Harris Corporation, Melbourne, FL; Martin-Marietta Corporation, Orlando, FL; Electronic Communications, Inc., St. Petersburg, FL; and Cincinnati Electronics, Cincinnati, OH.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: (a) The Phase I DSCS became operational in July 1967 and was originally composed of 26 satellites, 16 Heavy Terminals, and 13 Medium Terminals. In FY 1969 this capability was expanded to include wideband transmission of high resolution photographic data. In FY 1970, a contract was awarded for engineering development of a Heavy Terminal, followed in FY 1972 by an engineering development contract for a Time Division Multiple Access (TDMA) capability. In FY 1973 engineering development of the AN/USC-28 Spread Spectrum equipment and the Light Terminal was initiated. In FY 1974 an engineering development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment. The Heavy Terminal, Light Terminal, TDMA, and QPSK developments were completed by FY 1975. The QPSK equipment is a major element in the Digital Communications Subsystem. These subsystems are under fabrication by Tobyhanna Army Depot and will be used with the Heavy Terminal (AN/FSC-78) which is presently in production. Developments were initiated in FY 1975 for G/T 34 and G/T 26 antennas which are required for use with the Medium and Light Terminals. These antennas were completed in FY 1976 and FY 1977, respectively. Development of the AN/USC-28 was completed in FY 1977. Design Approaches for Burst Error correction equipment and Low Rate Multiplexer were also completed in FY 1977. This equipment is required to increase accuracy and efficiency during antijam operations. In FY 1978 advance development of the Pilot Control System was completed. Contracts were also awarded for extension of the Pilot Control System, continuation of the low rate multiplexer development, development of a conferencing and beacon entry capability for the AN/USC-28, advance development of a Burst Error Correction Coder, and interface of the Satellite Configuration Control Element (SCCE) and the AN/FSC-78 terminals.

(b) Tactical Satellite Communications System (TACSATCOM): As a result of a Joint-Service Program, the Army and the Air Force contracted for advanced development models of ground and airborne terminals in the Ultra High Frequency (UHF) and Super High Frequency (SHF) spectrums. Test results proved the feasibility of using satellite communications to meet tactical requirements and a system development plan was prepared. In December 1972 an engineering development contract was awarded to RCA Corporation, Camden, NJ, for SHF multichannel ground terminals to be mounted in 1/4-ton trailers and 1-1/4-ton trucks. In FY 1974 the SHF small terminal contract was expanded to include an engineering development model of a SHF Communications Control Facility. Engineering development contracts were awarded for an UHF Antenna to Harris Corporation, Melbourne, FL, a TACSAT Signal Processor (TSSP) to Martin-Marietta Corporation, Orlando, FL, and an UHF Manpack transceiver to Cincinnati Electronics, Cincinnati, OH. An advanced development contract was also awarded for a Control/Network Terminal Modem with Harris Corporation, Melbourne, FL. In FY 1976 the SHF multichannel satellite Communication terminals were type classified STANDARD and a contract was awarded for a Low-Rate-Initial-Production (LRIP) quantity of terminals. In FY 1977 the Communication Control Facility (AN/TSQ-118) was type classified STANDARD. In FY 1978 an engineering development contract for the Antijam/Control Modem was awarded. This modem is required to provide protection against jamming for the multichannel SHF Initial System. Development Test/Operational Test (DT/OT) II testing of SC-UHF Manpack system was initiated and will be completed in FY 1979. An advance development model of a SHF hardened antenna was also developed and tested.

(c) Satellite Communications: In FY 1974, a contract was awarded for investigation into the potential application of a Millimeter Wave Antenna. Investigations were also initiated for a Peak Power Amplifier and potential use of a Ground Mobile Forces Satellite System. Investigation into these areas continued through FY 1977. In FY 1977 study efforts were initiated for a low cost antenna tracking system, a surface acoustic wave bandpass filter, a 40 megabit/second MBS coder, and an alternate frequency investigation. In FY 1978 the 40 Megabit Coder investigation and a feasibility model Low Power/Peak Power Amplifier tube was completed. Development of a low cost antenna tracking system also continued. This system eliminates the need for a programer or servo-system for application in the low cost SHF terminal development effort. Efforts on the 20 GHz receiver feasibility model were also continued. Electromagnetic Compatibility Analysis of the GMFSC terminals was initiated.

2. FY 1979 Program: (1) Defense Satellite Communications System (DSCS): An engineering development (ED) contract for the Real Time Adaptive Control System (RTACS) will be awarded. Developments for the Conferencing and Beacon Entry equipment, required for fielding of a jam resistant secure conferencing capability, extension of the Pilot Control System, fabrication of the low rate multiplexer feasibility model, advanced development of the Burst Error Coder, and the SCCE/FSC-78 terminal interface will be completed. (2) TACSATCOM: Studies and exploratory development for the terminal to be used in the multichannel objective system of the 1990's, will be initiated. This objective system will provide greater protection against jamming and will increase efficient use of satellite resources by a factor of four. Engineering Development efforts for the antijam/control moden to be used with the multichannel SHF initial system will continue.

3. FY 1980 Planned Program: (1) Defense Satellite Communications System (DSCS): Continue engineering development of the Real Time Adaptive Control System (RTACS). Award a contract for Retrofit of the Satellite Configuration Control Element (SCCE) for operation with BATSON II. Engineering development efforts for the Burst Error Correction Coder and the Adaptive Power Control equipment will be initiated. (2) Tactical Satellite Communications (TACSATCOM): Continue engineering development efforts of the Antijam/Control Modem for the multichannel initial system (MCIS) terminals. Advanced development efforts for the Super High Frequency (SHF) Demand Assigned Multiple Access (DAMA) Modem for the Multichannel Objective System will be initiated. This objective system is being developed for fielding in the 1990's, will increase protection against jamming threats, and will improve the efficient use of satellite resources. An advanced development contract for six each single channel DAMA terminals will be awarded. (3) Satellite Communications: Continue electromagnetic compatibility analysis of the Ground Mobile Forces Satellite Communications Terminals. Increase in FY 1980 planned funding over the FY 1979 level is required to continue development of the RTACS which is essential for operation with the DSCS III satellites scheduled for early 1983 launch. All necessary experimental work will be performed and proposed systems will be ready for full-scale development.

4. FY 1981 Planned Program. (1) DSCS: Continue the engineering development effort for RTACS. The SCEE retrofit development efforts for BATSON II will be completed and a contract will be awarded to support the SCCE engineering development models. The Burst Error Coder and the Adaptive Power Control engineering developments will be completed. Engineering development contracts will be awarded for a Low Rate Multiplexer and a Spread Spectrum Monitor. (2) TACSATCOM: Development Test/Operational Test (DT/OT) II testing of the Antijam/Control Modem for the multichannel SHF initial system terminals will be completed. Advanced development efforts for the SHF Demand Assigned Multiple Access Modem for the multichannel objective system will be completed and advanced development of the single channel SHF DAMA System terminals will continue. (3) Satellite Communications: Development of a K-Band terminal, a solid state low noise K-Band frequency amplifier, and a high power K-Band power amplifier will be initiated. This equipment is required to allow operations in the higher frequency bands and relieve congestion in the lower frequency ranges. Investigations will be initiated into the feasibility of unattended earth terminal operations. Electromagnetic compatibility analysis of GMFSC terminals will continue. All necessary experimental work will be performed and the proposed systems will be ready for full-scale development.

5. Program to Completion. This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D253

Title: Defense Satellite Communications System-Defense Communications System (Phase II)

Program Element: #3.31.42.A

Title: Satellite Communications Ground Environment

DoD Mission Area: #521 - Satellite Communications

Budget Activity: #5 - Intelligence and Communications

A. DETAILED BACKGROUND AND DESCRIPTION: The Initial Defense Communications Satellite Project (IDCSP) was initiated in 1962 to establish research and development in military satellite communications and to provide a limited operational capability. Investigation of satellite communications was necessary to: improve service, quality, capacity and reliability of segments of the Defense Communications System (DCS); provide contingency communications required during crisis or limited war; and provide communication for high priority users. The IDCSP evolved into the Phase I, Defense Satellite Communications System (DSCS) which became operational in 1967. To improve the capacity, reliability, and quality of the DSCS, a Phase II program was approved in June 1968 and initiated in FY 1969. Phase II, DSCS, employs new satellites, terminals, and modulation equipment. In the DSCS program, the Army develops the satellite communications ground terminals and associated equipment in response to requirements developed by the Defense Communications Agency (DCA) and approved by the Office of the Secretary of Defense (OSD). The Phase I, DSCS ground complex consisted of two types of terminals--the Heavy and Medium Terminals. In Phase II, DSCS, the Army has developed new Heavy, Medium, and Light Terminals, and associated modulation equipment to convert the DSCS to a digital system with a higher capacity and reliability. These improved terminals are required to satisfy known and contingency operational needs of the World Wide Military Command and Control System (WWMCCS), the National Communications System (NCS), and other elements of the DCS. In order to optimize the capacity and efficiency of the DSCS the Army is charged with the development of a control system that will provide an effective control capability for the expanded DSCS of the 1980's. Past efforts resulted in the development of a manual control system for the IDCSP and for Phase II, DSCS, the first automated Pilot Control System. Present and future efforts are directed toward expanding the Pilot Control System and developing a Real Time Adaptive Control System to automate, expand, and increase the speed and accuracy of the control functions for the DSCS. Following the US Air Force development of the DSCS III satellite and the Satellite Communications Control Element (SCCE), the Army will procure the SCCE. The SCCE will provide the DSCS Control System with an improved and automated capability for allocating satellite resources. The SCCE will provide operational command and control of the DSCS III satellites to optimize utilization of premium satellite resources in support of real time user requirements. Present and future efforts are also directed toward providing other increased capabilities. Spread Spectrum Conferencing and Beacon Entry equipment will provide a communications conferencing capability and an alternative means of establishing communication links with the Spread Spectrum Multi-Access (SSMA , AN/USC-28, antijam equipment. This conferencing capability is needed for WWMCCS and to expand the utility of secure communications. The Low Rate Multiplexer is a less expensive, programable multiplexer that will be used for low data rate users. It provides an alternative to existing new equipment and is adaptable to SSMA use to provide jam resistant communications. The Burst Error Correction Coder provides both forward error correction coding and protection against burst jamming. It is needed for use with the AN/USC-28.

Project: #D253

Title: Defense Satellite Communications System-Defense Communications System (Phase II)

Program Element: #3.31.42.A

Title: Satellite Communications Ground Environment

DoD Mission Area: #521 - Satellite Communications

Budget Activity: #5 - Intelligence and Communications

B. RELATED ACTIVITIES: The Defense Communications Agency (DCA) is the Defense Satellite Communications System (DSCS) Program Manager. In support of the DSCS, the Army is responsible for development of the ground environment; the Air Force is responsible for development and launching of the satellite; and the Navy is responsible for development of the shipboard terminals. The ground environment consists of the earth terminals, modulation equipment, Anti-jam (A/J) equipment, and the Jam Resistant Secure Conferencing (JRSC) equipment being developed for the World Wide Military Command and Control System (WWMCCS).

C. WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ, has been designated the project office for the development of the ground complex of the Defense Satellite Communications System. The Commander of the Agency is the Project Manager. Primary contractors for the Phase II systems are: Ford Aerospace Corporation, Western Development Laboratories Division, Palo Alto, CA, for the Pilot Control System extension (PCS-X); Raytheon Company, Sudbury, MA, for the Pseudo Noise/Time Division Multiple Access PN/TDMA equipments; and Linkabit, LaJolla, CA, and Needham, MA, for the Burst Error Correction Coder. Magnavox Research Laboratories, Torrence, CA, for the spread spectrum conferencing and beacon entry equipment; General Atronics, Philadelphia, PA, for the Low Rate Multiplexer.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The Phase 1 Defense Satellite Communications System (DSCS) became operational in July 1967 and was composed of 28 satellites, 16 Heavy Terminals, and 13 Medium Terminals. In FY 1969, a capability was developed and made operational for wideband transmission of high resolution photographic data. In FY 1970, a contract was awarded for engineering development of a heavy terminal, followed in FY 1972 by an engineering development contract for Time Division Multiple Access (TDMA) and in FY 1973 for engineering development of the AN/USC-28 Spread Spectrum equipment and the Light Terminal. In FY 1974 an engineering development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment. The Heavy Terminal, Light Terminal, TDMA, and QPSK developments were completed by FY 1975. The QPSK equipment is a major element in the Digital Communications Subsystems presently under fabrication by Tobyhanna Army Depot to be used with the Heavy Terminal (AN/FSC-78) and Medium Terminal (AN/GSC-39V). All AN/FSC-78's have been delivered on a worldwide basis to the tri-service operating command for operation in the DSCS. The AN/GSC-39V is in production. The TDMA equipment became the basis for development of Pseudo Noise Time Division Multiple Access (PN/TDMA) equipment, the contract for which was awarded FY 1976. Developments were initiated in FY 1975 for G/T 34 and G/T 26 antennas for use with the Medium and Light Terminals and were completed in FY 1976 and FY 1977, respectively. Design approaches for the Burst Error Correction equipment and Low Rate Multiplexer, were also completed in FY 1977. Engineering development of the AN/USC-28 was completed in FY 1977, and in FY 1978 advanced development of the Pilot Control System was completed. In FY 1978, the following contracts were awarded: an extension to the Pilot Control System development, a low rate multiplexer feasibility model development, development of a conferencing and beacon entry capability for the AN/USC-28, parallel advanced development contracts for a Burst Error Correction Coder, and a contract for equipment to interface the SCCE and the AN/FSC-78 terminals.

Project: #D253

Title: Defense Satellite Communications System-Defense Communications System (Phase II)

Program Element: #3.31.42.A

Title: Satellite Communications Ground Environment

DoD Mission Area: #521 - Satellite Communications

Budget Activity: #5 - Intelligence and Communications

2. FY 1979 Program: The most significant contract to be awarded in this year will be the engineering development of the Real Time Adaptive Control System (RTAC). The AN/USC-28 conferencing and beacon entry development will be completed. The following developments will be completed during FY 1979: Pilot Control System extension; Low Rate Multiplexer; Pseudo Noise Time Division Multiple Access (PN/TDMA) test and software tasking; Burst Error Coder; Satellite Communications Control Element (SCCE)/FSC-78 interface; and AN/USC-28 conferencing and beacon entry.

3. FY 1980 Planned Program: The Real Time Adaptive Control System development will continue through this fiscal year. In addition, contracts will be awarded for: SCCE Software Retrofit to enable operation with Batson II communications security equipment; engineering development of the Burst Error Correction Coder to expand the protection of spread spectrum equipment under burst jamming conditions; and, engineering development of the Adaptive Power Control equipment to provide the capability for automatic power adjustment in the RTACs. For the Real Time Adaptive Control development, a separate contract will be awarded for validation and verification of software. All necessary experimental work will be performed and all proposed systems will be ready for full scale development.

4. FY 1981 Planned Program: The Real Time Adaptive Control System development will continue through this fiscal year. The SCCE retrofit for Batson II will be completed and a contract will be awarded for support of the SCCE engineering development models. The Burst Error Correction Coder and Adaptive Power Control engineering developments will be completed. Engineering development contracts will be awarded for the Low Rate Multiplexer and the Spread Spectrum Monitor. The validation and verification effort in support of the Real Time Adaptive Control System will continue. All necessary experimental work will be performed and the proposed system will be ready for full scale development.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable

Project: #D253 Title: Defense Satellite Communications System-Defense Communications System (Phase II)

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment

DoD Mission Area: #521 - Satellite Communications Budget Activity: #5 - Intelligence and Communications

7. Resources ($ in thousands):

	Fy 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5864	3663	9000	11300	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	5000	3663	10502	-	Continuing	Not Applicable
Quantities *						
Other Procurement, Army						
Funds (current requirements)	54400	42800	112400	91100	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	55700	42800	79200	-	Continuing	Not Applicable
Quantities *						

The increase in procurement funds for FY 1980 is a result of adding the Worldwide Military Command and Control System (WWMCCS) requirement for, satellite equipment to support the Jam Resistence Secure Conferencing (JRSC) capability. Increase in FY 1978 RDTE funding level of $864 thousand from the FY 1979 submission was required to support development of the Real Time Adaptive Control System. This increase came from projects D456 (Tactical Satellite Communication) and D450 (Satellite Communications) in the same Program Element. Decrease in the FY 1980 RDTE funding level is a result of funding limitations.

* Large numbers of diverse items.

FY 1980 RDTE Congressional Descriptive Summary

Project: #D456 — Title: Tactical Satellite Communication Systems
Program Element: #3.31.42.A — Title: Satellite Communications Ground Environment
DoD Mission Area: #521 - Satellite Communications — Budget Activity: #5 - Intelligence and Communications

A. DETAILED BACKGROUND AND DESCRIPTION: The Army, along with the Air Force and Marine Corps, requires a family of manpack and mobile Tactical Satellite Communications (TACSATCOM) terminals to improve the effectiveness and reliability of the communications equipment needed to meet critical tactical command and control and intelligence requirements. TACSATCOM will provide communications links over difficult terrain profiles with quick set-up/tear-down times and will offer the highest possible assurance of positive and continuous communications between widely dispersed and fast-moving tactical forces. TACSATCOM will further reduce the threat of physical damage by allowing personnel to deploy terminal equipment at sites less exposed to detection and direct fires. The objectives of this program are: (a) to develop and procure single channel and multichannel tactical satellites communication capabilities for use by Ground Mobile Forces; (b) to develop operational concepts; and, (c) to support special military operational needs. This equipment will replace existing line-of-sight equipment where it is more cost effective or where it meets essential military requirements that are not being actively accomplished by other means.

B. RELATED ACTIVITIES: Management of the Army TACSATCOM Program is vested in the Project Manager, Satellite Communications, Ft Monmouth, NJ. The Army is responsible for development of ground terminals for all Services. Similarly, the Air Force and Navy are developing airborne and shipborne terminals respectively. The Air Force is also responsible for the development and launching of the satellites required to support all Services.

C. WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ, is the project office for the development and procurement of all ground terminals for the Services. Contractors include: RCA, Camden, NJ; Magnavox Government and Industrial Electronics Company, Fort Wayne, IN; Harris Corporation, Melbourne, FL; Martin-Marietta Corporation, Orlando, FL; and Cincinnati-Electronics, Cincinnati, OH. Also, work is performed by Tobyhanna Army Depot, Tobyhanna, PA, and Naval Ocean Systems Center, San Diego, CA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: As a result of a joint-service program, the Army and the Air Force contracted for advanced development models of ground and airborne terminals in the Ultra High Frequency (UHF) and Super High Frequency (SHF) spectrums. Subsequent tests results proved the feasibility of using satellite communications to meet tactical requirements. A System Development Plan was prepared and in December 1972 an advanced development contract was awarded to RCA Corporation, Camden, NJ for SHF ground terminals to be mounted in 1/4 ton trailers and 1 1/4 ton trucks. In FY 1974, the RCA SHF small terminal contract was expanded to include an engineering development for a SHF Communications Control Facility required to

better utilize the full capability of existing and planned satellites. Engineering development contracts were also awarded for: Ultra High Frequency (UHF) Antennas to Harris Corporation, Melbourne, FL; Tactical Satellite (TACSAT) Signal Processor (TSSP) to Martin-Marietta Corporation, Orlando, FL; and UHF Manpack Transceiver to Cincinnati-Electronics, Cincinnati, OH. An advanced development contract was awarded for an Anti-Jam/Control Modem with Harris Corporation, Melbourne, FL. In FY 1976, the SHF Satellite Communication Terminals were type classified and a contract was awarded for a Low-Rate Initial-Production (LRIP) quantity of SHF terminals. In FY 1977, developmental contractual efforts were completed on the Manpack Transceiver and the AJ/Control Modem; and, The Communication Control Facility (AN/TSQ-118) was type classified. In FY 1978, an engineering development contract was awarded for an Anti-Jam/Control Modem for the multichannel SHF initial terminals. Development Test/Operational Test II (DT/OT II) testing of the UHF Manpack System was initiated in FY 1978 and will continue into FY 1979.

2. FY 1979 Program: Continue engineering development of the Anti-Jam (AJ)/Control Modem for Multichannel initial system terminals.

3. FY 1980 Planned Program: Complete engineering development and initiate Development Test/Operational Test (DT/OT) II testing of the Anti-Jam/Control Modem capability which is critical to the Multichannel Initial System fielding. Award advanced development contract which will provide highly jam resistant single channel satellite radios for nuclear and critical command and control communications. Initiate advanced development of a multichannel objective system that will be fielded in the 1990's to replace existing first generation multichannel systems. This multichannel objective system will increase the efficient use of premium satellite capacity by a factor of four, as well as increase anti-jam protection. This program effort was previously funded under PE 2.80.10.A, project D113, (Joint Tactical Communications Program).

4. FY 1981 Planned Program: Complete Development Test/Operational Test (DT/OT) II testing of the Anti-Jam/Control Modem for the multichannel SHF initial systems terminals. Complete Advanced Development (AD) of the multichannel Demand Assigned Multiple Access (DAMA) Modem for the multichannel objective system. Continue AD of the single channel SHF DAMA System Terminals.

5. Program to Completion: This is a continuing program. Completion of all engineering development contracts, DT/OT's, and introduction of the family of terminals in the Army inventory remain to be accomplished. Related research and development efforts in the area of modems, exciter drivers, etc., will continue toward more efficient use of satellite power.

Project: #D456 Title: Tactical Satellite Communication Systems
Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DoD Mission Area: #521 - Satellite Communications Budget Activity: #5 - Intelligence and Communications

6. Major Milestones: Not Applicable

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirement)	2492	4034	11100	9300	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	3195	4034	8200	-	Continuing	Not Applicable
Quantities (current requirements)*						
Quantities (as shown in FY 1979 submission)*						
Other Procurement, Army:						
Funds (current requirements)	9300	65200	27200	110000	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	9000	65200	81100	-	Continuing	Not Applicable
Quantities (current requirements)*						
Quantities (as shown in FY 1979 submission)*						

* Large number of diverse items.

Reduction in FY 1980 procurement funding is a result of delaying the procurement of multichannel initial system terminals until the latter part of FY 1979; thereby, reducing the total funds required in FY 1980. The increase in RDTE funding for FY 1980 is required to support funding for the multichannel objective system that has been transferred from PE 2.80.10.A, project D113. The decrease in actual FY78 funding of $703 thousand resulted from transfer of this amount to project D253 (Defense Satellite Communications System) in the same Program Element to support development effort on the Real Time Adaptive Control System.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	QUANTITIES						Not Applicable
D491	Communications Security Equipment and Techniques					Continuing	Not Applicable
D901	Signal Security Activities					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:

C. BASIS FOR FY 1980 REQUEST:

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

D. BASIS FOR CHANGE BETWEEN FY 1980 and FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	[illegible]	[illegible]	[illegible]	Continuing	Not Applicable

The decrease in FY 1978 was due to redirection of funds to higher priority programs. The decrease in FY 1980 from previous request is also due to reprograming to higher priority programs.

E. OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

F. DETAILED BACKGROUND AND DESCRIPTION: This program supports Army, and joint COMSEC requirements. Primary exploratory efforts include continuing examination of voice and data security techniques required to satisfy present and future Army requirements. Primary engineering development efforts are; (1)

G. RELATED ACTIVITIES: These efforts represents those COMSEC developments assigned to the Army by National Security Agency. Program Element 3.31.26.A (formerly 6.47.01.A) Communication Engineering Development is related to this effort.

H. WORK PERFORMED BY: Developing agencies - US Army Communications Research and Development Command, Project Manager, Single Channel Ground and Airborne Radio System, of Fort Monmouth, NJ; Tobyhanna Army Depot, Tobyhanna, PA. Contractors include: Magnavox Corporation, Fort Wayne, IN; General Atronics Corporation, Philadelphia, PA; Watkins Johnson Corporation, Gaithersburg, MD; Digital Equipment Corporation, Maynard, MA; Bendix Corporation, Baltimore, MD; Harris Corporation Melbourne, FL; Atlantic Research, Alexandria, VA; Honeywell Corporation, Shrewsbury, NJ.; Southwest Research Corporation, San Antonio, TX.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments:

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

2. FY 1979 Program:

3. FY 1980 Planned Program:

4. FY 1981 Planned Program:

5. Program to Completion: This is a continuing program.

DEFENSEWIDE MISSION SUPPORT

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.15.A
DoD Mission Area: #622 - Aerial Targets

Title: Target Missiles
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
D238	Target Missiles					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this element is to develop and evaluate aerial targets and ancillary equipment required for realistic and cost effective target systems to evaluate air defense weapon systems and to train air defense units. Close coordination is maintained with other Services through the Joint Logistic Commanders Conference to insure maximum standardization of target systems.

C. BASIS FOR FY 1980 RDTE REQUEST: The FY 1980 budget request supports the Army participation in joint Service target programs. Effort will continue in developing a low-cost, subsonic, subscale target as an economical replacement for several existing higher cost or lower performance targets. Army's unique requirement for droned aircraft targets will continue to be defined and developed. Studies will be conducted on developing target ancillary equipment such as radar augmentation systems, infrared augmentation systems, and miss distance indicators.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)				Continuing	Not Applicable

Program Element: #6.33.15.A
DoD Mission Area: #622 - Aerial Targets

Title: Target Missiles
Budget Activity: #6 - Defensewide Mission Support

The funding profiles between the FY 1980 and FY 1979 Congressional Descriptive Summaries changed because of a reduction of funds during the authorization hearings. The FY 1979 program is expected to be funded at the authorized level with an additional. This low level of authorized funds resulted in a revised research and development (R&D) target effort. The FY 1980 estimate is the minimum required to sustain Army's R&D effort to develop new aerial targets. The FY 1981 program is under review and will be submitted in the FY 1981 budget consideration. Current planning indicates the FY 1981 request will be approximately the same as the FY 1979 request,

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)					Continuing	Not Applicable
Funds (as shown in FY 1979 submission)					Continuing	Not Applicable
Quantities (current requirements)	*	*	*	*	Continuing	Not Applicable
Quantities (as shown in FY 1979 submission)	*	*	*	*	Continuing	Not Applicable

The change in the FY 1980 estimate is due to an increase in target requirements.

* Various targets.

F. DETAILED BACKGROUND AND DESCRIPTION: The primary effort will be development effort of a joint Service subsonic, subscale target capable of meeting the present and future requirements for research and development system testing and training in a cost-effective manner. The effort will examine modifications to current targets to reduce the cost and increase performance to meet the requirements of a common joint Service target for the 1980's. The new target is to replace five targets that will be phasing out of the target inventory in the 1980's. Efforts will continue on the droned aircraft program which incorporate the Army's unique requirements into full-scale drones provided by the Air Force. The target ancillary equipment efforts will study augmentation devices that will allow subscale targets to appear as full-scale threats and fully exercise the capabilities of the air defense systems. The infrared augmentation effort will augment existing targets to generate hot gaseous plumes for testing of STINGER and CHAPARRAL. Radar augmentation devices will be studied to provide targets for missile guidance and warhead fuzing tests for PATRIOT. A study will continue on providing accurate miss distance data using laser technology.

G. RELATED ACTIVITIES: The Department of the Army maintains close liaison with both the Navy and the Air Force regarding target missile systems. Where possible, such as in the Droned Aircraft program of the US Air Force, the Army will take advantage of the results of other Service programs to meet Army requirements. Coordination of requirements and technical development is closely monitored to insure that all Services get maximum benefit from the development efforts. The major coordination body for this combination of Service efforts is the Joint Logistical Commander's Conference. The Army also maintains liaison with target development agencies in Australia, Canada, and the United Kingdom through the Target Technical Cooperation (TTCP) Subgroup H, Aerial Target and Drone Working Group annual conferences.

H. WORK PERFORMED BY: The US Army Missile Materiel Readiness Command, Huntsville, AL, is responsible for the target missile program. For the following programs, the associated contractors involved are: F-86 drone program - Flight Systems, Inc., Newport Beach, CA; infrared augmentation program - Hayes International, Birmingham, AL, and Atlantic Research Corporation, Alexandria, VA; miss distance measuring program - Babcock Electronics, Costa Mesa, CA; radar augmentation - Hayes International Corporation, Leeds, AL. The subsonic, subscale target program is not released to industry yet.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The FIREBEE/TOWBEE drone system has been the principal research and development product assurance and training program of interest over the past several years. Associated with the FIREBEE has been development of infrared (IR) and radio frequency (RF) augmentation, scoring devices and towed banners. The results of these efforts have provided the Army with fairly realistic and reliable targets for use in test, evaluation, and training. In addition to the FIREBEE, work was concluded on the ROADRUNNER and CARDINAL Targets and the Mobile Target Tracking System (MMTS). In FY 1972, two contracts were awarded for the development of prototype targets for the Variable Speed Training Target (VSTT) program.

VSTT development continued with the fabrication of the competing candidate prototype and engineering design tests were conducted. Development Test (DT) II was initiated in FY 1974. Other programs initiated in FY 1974 were augmentation devices to generate hot gaseous plumes, control systems, and Vector Miss Distance Indicator (VMDI). In FY 1975, Variable Speed Training Target (VSTT) Development Test II was completed and a single contractor was selected to produce the target. Continuing programs included laser MDI and plume augmentation. The formation control program was completed except for specific computer programing for multitarget flight profile requirements. The program initiated included drone aircraft, maneuver kits, and radar augmentation. In FY 1976, the VSTT program entered the production phase. DT III was completed in 1976. Other programs included VMDI, plume augmentation, drone aircraft, maneuver kits, and radar augmentation. FY 197T programs included effort in developing VMDI, radar and plume augmentors, and drone aircraft and theit ancillary equipment, and consideration of a high performance, economical test target were continued. The FY 1977 programs included VMDI, plume augmentation, drone aircraft, low altitude maneuving target, high performance towed gun target, radar augmentation and the high performance, economical test and evaluation target. No research, development, test and evaluation (RDTE) program was conducted in FY 1978 because the funds were not appropriated by Congress.

2. FY 1979 Program: The initial effort is developing a low-cost subsonic, subscale target as an economical replacement for several existing higher cost or lower performance targets. Defining and developing Army unique requirements for droned aircraft and developing target ancillary equipment will continue.

3. FY 1980 Planned Program: Continue but at a reduced rate, the effort in developing the low-cost subsonic, subscale target to satisfy Army and other service target requirements for testing Air Defense Weapons Systems in a cost effective manner. The low cost target will be achieved by modification and supplementing the existing MQM-107A target. Improvements will include propulsion increase for higher performance, lengthened fuselage for added payload capability, new autopilot, new supercritical control surfaces, and new and improved ancillary devices. Specific objectives for FY80 are: Industry proposals will be evaluated; cost effectiveness trade-off design studies evaluating modifications to existing targets will be conducted; testing of design modifications will be accomplished within funding limits; update long range planning of the low cost target development program; and plan the acquisition strategy and complete administrative functions for award of development contract. This modified target will be available for less than $100K as compared to $175K to $500K for presently utilized FIREBEE targets and full scale aircraft. The older higher cost, full scale and subscale targets will be used for special tests required to exercise the upper parameter of a missile's performance. FY 1980 program will provide minimal funding for Army's unique requirements in the full scale drone aircraft program, specifically, modification of the QF-86E, QF-100, and PQM-102 to accept Army auxillary devices. The sustaining effort for the development of target ancillary equipment such as infrared plume generators, laser miss distance indicators, and radar augmentation devices will be temporarily discontinued. Other target requirements will be evaluated and preliminary concept formulation be initiated.

4. FY 1981 Planned Program: The FY 1981 program is under review and the funds to support these requirements will be submitted in the FY 1981 budget considerations. Estimates of the funding in the amount of are being evaluated. Plans for the FY 1981 program are to contract for the development of the low cost subscale, subsonic target (modified MQM-107A) effort. This effort would replace targets of a high cost or lessor performance except for special missile firings at the extremes of the air defense threat. Modifications will be made to full-scale droned aircraft (QF-100, QF-86E and PQM-102), to satisfy Army's unique ancillary equipment requirements. Design efforts to meet the consolidated air defense target training requirements currently are being formulated. Development of target simulation of ancillary devices, infrared plume generators, laser miss diatance indicators and radar augmentation devices to provide more realistic threat simulation and improved scoring capability will be reinitiated. Evaluation and concept formulation for meeting requirements for new and future Air Defense Weapons Systems will be continued.

5. Program to Completion: It is anticipated that the low cost target program will be completed in FY83. Ancillary devices will require updating and development on a continuing basis to maintain the state-of-the-art for Air Defense Weapons Systems.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.18.A
DoD Mission Area: #624 - Other Test and Evaluation Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
D190	Tri-Service Electro-Optic Weapons Vulnerability/ Susceptibility					Continuing	Not Applicable
D235	Missile Counter-Counter-Measure (CCM) Technology					Continuing	Not Applicable
D267	Missile Vulnerability/ Susceptibility					Continuing	Not Applicable
D626	Non-Missile Vulnerability/ Susceptibility					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objectives of this program are to: determine the susceptibility to electronic countermeasures (ECM) of US Army missile systems and nonmissile communications and electronic equipments; determine the ECM vulnerability of enemy missiles representing a threat to the tactical commander; develop prototype electronic warfare systems to exploit the ECM vulnerability of enemy electronic systems; and provide to US Army developers recommendations on electronic counter-countermeasures (ECCM) circuits and devices for both missiles and nonmissile electromagnetic systems that will reduce the vulnerability of US systems to enemy electronic warfare operations.

C. BASIS FOR FY 1980 RDTE REQUEST: Funds are required to continue testing US systems against electronic countermeasures. New items of equipment must be obtained to support realistic testing of PATRIOT and other air defense missile systems. Jammers must be fabricated to support operational/developmental testing of PATRIOT. Special Electromagnetic Interference (SEMI) work will continue to include missile measurements and jammer development, Electronic Warfare test bed instrumentation for field evaluation of the Stand-Off Target Acquisition System (SOTAS), Single Channel Ground Airborne Radio System (SINCGARS), Counter Mortar/ Counter Battery Radar Systems (AN/TPO-36/37), Position Location Reporting System (PLRS), and other communications electronics systems will be accelerated. Tri-Service exploitation of foreign missile systems will continue.

Program Element: #6.37.18.A
DoD Mission Area: #624 - Other Test and Evaluation Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	[redacted]		[redacted]	Continuing	Not Applicable

Decrease in FY 1978 is due to reprogramming to meet higher priority requirements. Decrease in FY 1980 is due to budgetary constraints, which were not anticipated in the FY 1979 submission.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optical dependent systems are susceptible to electronic countermeasures (ECM) to some degree. All such US Army systems must be analyzed so that their susceptibilities are determined and counter-countermeasures are developed to assure their effectiveness in a hostile ECM environment. Hostile threat systems must also be analyzed in order that their electronic warfare (EW) susceptibilities may be exploited by the United States. This program provides for EW susceptibility investigations of the missile systems, electro-optical systems, other electronic dependent systems, and electronic counter-countermeasure technology of the US Army as well as foreign hostile missile systems which represent a threat to the tactical field commander. Recommendations designed to eliminate or reduce the susceptibility of Army systems, including proposed hardware, software, and operating procedure changes, are provided to system developers. The susceptibilities detected in foreign threat systems are provided to appropriate intelligence and ECM system development activities for exploitation. This program consists of eighteen task areas: twelve for missile systems, four for other electronic dependent systems, one for tri-Service electro-optic systems, and one for missile electronic counter-countermeasures technology.

G. RELATED ACTIVITIES: Other related research and studies are performed by the Air Force and Navy. Air Force work is accomplished in Program Elements (PE) 6.37.50.F, Countermeasures Advanced Development; 6.37.18.F, Electronic Warfare Technology; 6.37.43.F, Electro-Optic Warfare. Navy work is done in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs. Coordination is accomplished by exchange of technical reports, attendance at scientific meetings and conferences, joint development projects, and reviews conducted by the Office of the Secretary of Defense (Under Secretary of Defense for Research and Engineering). A joint Army, Navy, Air Force and Marine Corps project for electro-optically guided weapons countermeasure tests is being conducted under a program funded through FY 1980 by the Under Secretary of Defense for Research and Engineering. The Army is Executive Agent for this program.

H. WORK PERFORMED BY: In-house research, development, exploitation, and missile system susceptibility analyses are conducted by the Office of Missile Electronic Warfare (OMEW), US Army Electronics Research and Development Command (ERADCOM), White Sands Missile Range (WSMR), NM. In-house research, development, and nonmissile vulnerability electronic counter-countermeasure analyses are conducted by the Electronic Warfare Laboratory, US Army Electronics Research and Development Command, Fort Monmouth, NJ. In-house missile counter-countermeasure technology programs are conducted by the US Army Missile Research and Development Command (MIRADCOM), Huntsville, AL. Operational tests of laser designated weapons are conducted by the Office of the Test Director, Joint Electro-Optics Guided Weapons Countermeasures Test Program, WSMR, NM. Major contractor support is provided by GTE Sylvania, Mountain View, CA; New Mexico State University, Las Cruces, NM; General Dynamics Corp., Fort Worth, TX; Sanders Associates, Nashua, NH; and Stanford Research Institute, Menlo Park, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

1. FY 1978 and Prior Accomplishments: Electronic countermeasure (ECM) vulnerability studies have been conducted on SAFEGUARD, PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, TOW, HELLFIRE, COPPERHEAD, Improved HAWK, REDEYE, STINGER, CHAPPARAL, US ROLAND, PATRIOT, and other Army missile systems and missile radar fuzes. Highly versatile capabilities to conduct infrared and unintentional radiation measurements have been established and measurements on aircraft, weapon systems, and countermeasure devices were conducted. Plans to incorporate ultraviolet and millimeter signature measurement capabilities into these facilities have been completed. PATRIOT missile system ECM Phase II testing and initial studies for system effectiveness against ECM threat specifications were completed. Investigations have been initiated on the Division Air Defense Gun System (DIVADS) and the STINGER/Passive Optical Seeker Technique (POST) system. Vulnerability investigations of Improved HAWK product improvements were conducted. Plans for ECM participation in tests of the US ROLAND system were completed and testing initiated. ECM tests of the solid state track link for the TOW missile system were completed and smoke/aerosol tests of electro-optically guided weapons (including beamrider concepts) were conducted. ECM investigations of the advanced development (AD) PERSHING II system have been completed. Vulnerability tests and analyses on the HELLFIRE and competing COPPERHEAD AD laser seekers were completed and investigations related to proposed engineering development laser seekers are continuing. Several ECCM recommendations for both HELLFIRE and COPPERHEAD have been implemented with others pending. A joint Army/Air Force test demonstrated the effectiveness of ECM against aircraft attack, terrain avoidance, and terrain following radars and plans were developed for feasibility hardware of an ECM system based on this concept.
The feasibility of using a structurally sound radar absorbent material as a missile ECCM technique was demonstrated by flight tests of a missile scale model. Special Electromagnetic Interference (SEMI) investigations and field firing tests were conducted and the effects of this phenomenon on missile systems were demonstrated. Investigations into the effects of SEMI on night vision devices have been initiated. Tri-Service ECM and field tests on foreign missile systems are continuing and a handbook of susceptibility data on Soviet antitank guided missiles was completed.

A vulnerability assessment of the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter has been initiated.

A development program for electronic warfare (EW) threat instrumentation was started to provide a necessary jamming test bed for SINCGARS developmental/operational testing. A series of field tests were completed to determine feasibility of using SNAP ECCM technology on vehicular and airborne platforms and development of an airborne SNAP unit was initiated. EW vulnerability analyses of PERSHING and PATRIOT missile systems communications were initiated. In the radar area, EW vulnerability investigations and field tests were completed on the FIREFINDER countermortar/counterbattery radars, AN/GYS-5 laser rangefinder, the Stand-Off Target Acquisition System (SOTAS), and the AN/APS-94 side-looking airborne radar (SLAR). EW vulnerability assessments of the AN/UPD-2 SLAR data link and the Integrated Communications and Navigation System (ICNS) for Remotely Piloted Vehicles (RPV) were completed. EW vulnerability/electronic counter-countermeasure (ECCM) support was continued on the Position Location Reporting System (PLRS) program. Efforts were initiated to procure broad band jamming and sophisticated EW tests beds to support PLRS development/operational testing (DT/OT). EW vulnerability/ECCM support for concept formulation of tactical information distribution systems was initiated.

2. FY 1979 Program: Vulnerability investigations will be continued on all Army electronic weapons systems under development to include the following Army missile systems: PATRIOT, ROLAND, STINGER/POST, HELLFIRE, COPPERHEAD, TOW, PERSHING II, Improved HAWK, and DIVADS. PATRIOT and PERSHING II will enter engineering development phase electronic countermeasures (ECM) testing and analyses will be initiated in support of program decisions. Special Electromagnetic Interference (SEMI) investigations will be conducted on COPPERHEAD, STINGER/POST, and GRAY ROCK missile systems and the AN/TAS-5 night sight. ECM analyses of the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter (AAH) and proposed seekers and concepts for close combat weapons will continue. Electronic Warfare (EW) investigations of foreign missiles will be performed at tri-Service and command levels. EW/electronic counter-countermeasure (ECCM) support to major communications-electronics programs such as SINCGARS, Position Location Reporting System (PLRS), and tactical information distribution systems will continue. Planned facility upgrades include: incorporation of ultraviolet capability into measurement facilities, continuation of design of facility for test of surface target missile seekers, and initiation of automation of SEMI facilities and development of the Mobile Electronic Warfare Environment Simulator. Unique items of EW equipment required to support ongoing and planned vulnerability analyses will also be developed.

3. FY 1980 Planned Program: The ECM design analysis of PATRIOT will continue with advanced threats integrated and Development Tests/Operational Tests II EW field tests will be completed. STINGER/POST ECM simulations will be initiated and EW assessments of DIVADS competitive candidates will be conducted in support of the selection process.

SEMI investigations will be completed on COPPERHEAD, GRAY ROCK, and the AN/TAS-5 Night Sight; continued on STINGER/POST; and initiated on HELLFIRE and the XM-1 tank. Infrared, ultraviolet and millimeter signature measurements will be conducted in support of ongoing vulnerability analyses.

SOTAS ECCM verifications tests and EW field tests of the AN/TPQ-36 and AN/TPQ-37 counter mortar/counter battery radar systems production units will be conducted. Development of the first station of the Mobile Electronic Warfare Environment Simulator (MEWES) and threat instrumentation test beds for SINCGARS and PLRS will be completed. The major effort on establishment of the test facility for surface target missiles will be initiated. Development of Improved very high frequency (VHF) direction finding and ultra high frequency (UHF) will be initiated.

4. FY 1981 Planned Program: Assessment of the vulnerability of PATRIOT to the 1987 advanced threat will continue with field testing of hardware and software product improvements. Continued ECM support will be provided to STINGER/POST firing tests, US ROLAND tests, and Division Air Defense Gun System (DIVADS) developmental testing. Vulnerability investigations of the all-weather CHAPPARAL, air defense acquisition radars, and radar fuzes for cannon projectiles will be initiated. SEMI investigations on STINGER/POST, HELLFIRE, and the XM-1 tank will be completed and efforts on other electronic devices/systems will be initiated.

Signature measurements will be continued in support of EW vulnerability analyses. Development

of the test facility for surface target missiles will be completed. Vulnerability investigations of Electronic Warfare (EW) command and control systems and satellite communications will be initiated. Development of Mobile Electronic Warfare Environment Simulator (MEWES) will be completed and threat instrumentation developments for very high frequency (VHF) and ultra high frequency (UHF) communications systems will be continued.

Generic electronic counter-countermeasures (ECCM) techniques for laser guided weapon systems will be evaluated. Perform comparative analysis of quiet radar techniques.

Provide continuous development of EW equipment, techniques, and tactics in support of an Armywide EW program. Develop and implement an existing EW test facility that will insure validation and verification of Army missile system ECCM fix. Develop generic classes of Army missile systems that have common threat environments. Conduct validation tests and assessment of ECCM techniques in support of the various Army missile system project managers. The Stand-Off Target Acquisition System (SOTAS) program will be supported with ECM field testing and analysis. Electronic support measures and ECM tests will be conducted on Battlefield Surveillance and Target Acquisition Radar (BSTAR) to establish the system's baseline ECCM performance. EW vulnerability analyses will also be conducted on the data links related to Army intelligence, surveillance and target acquisition systems as well as selected foreign missile systems.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D267 Title: Missile Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optic dependent missile systems are vulnerable/susceptible to electronic countermeasures (ECM) to some degree. All such US Army missile systems must be analyzed so that their susceptibilities are determined and counter-countermeasures (CCM) are developed to assure their effectiveness in a hostile ECM environment. Hostile missile systems must also be analyzed in order that their electronic warfare (EW) susceptibilities may be exploited by the United States. The objective of this project is to: (1) determine the susceptibility to electronic countermeasures (ECM) of all US Army surface-to-surface and surface-to-air missile systems; (2) determine the ECM vulnerability of enemy tactical missiles that are a threat to the tactical commander; (3) develop prototype electronic warfare systems to exploit the ECM vulnerability of the enemy missile systems; and (4) provide to US Army missile developers recommendations for electronic counter-countermeasures (ECCM) circuits and devices that will reduce the vulnerability of our missile systems to enemy electronic warfare operations.

B. RELATED ACTIVITIES: Other related research and studies are performed by the Air Force and Navy. Air Force work is accomplished in Program Element (P.E.) 6.37.50.F, Counter-Countermeasures Advanced Development; 6.37.18.F, Electronic Warfare Technology; 6.37.43.F, Electro-Optic Warfare. Navy work is found in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs. Coordination is accomplished by reviews conducted by the Office of the Secretary of Defense (Under Secretary of Defense for Research, and Engineering) through the exchange of technical reports and attendance at scientific meetings and conferences.

C. WORKED PERFORMED BY: In-house research, development, exploitation, and missile system susceptibility analyses are conducted by the Office of Missile Electronic Warfare (OMEW), a subordinate element of the US Army Electronics Research and Development Command (ERADCOM) at White Sands Missile Range (WSMR), NM. Major contractor support is provided by GTE, Sylvania, Mountain View, CA; New Mexico State University, Las Cruces, NM; General Dynamics, Ft. Worth, TX. Additional unidentified contractors will perform on approximately 25 other contracts with a total dollar value of $5,374,000 for the project.

Project: #D267 Title: Missile Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

D. PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Electronic countermeasure (ECM) vulnerability studies have been conducted on SAFEGUARD, PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, TOW, HELLFIRE, COPPERHEAD, Improved HAWK, REDEYE, STINGER, CHAPPARAL, US ROLAND, PATRIOT, and other Army missile systems and missile radar fuzes. PATRIOT ECM Phase II testing and initial studies relating to system effectiveness against electronic warfare (EW) threat specifications have been completed. Vulnerability investigations, including field tests, of Improved HAWK electronic counter-countermeasures (ECCM) product improvements have been conducted. Plans for EW participation in tests of the US ROLAND have been completed and testing initiated. EW investigations have been initiated on Division Air Defense Gun System competitive candidates and on the dual band (infrared/ultraviolet) STINGER/POST (Passive Optical Seeker Technique) system. ECM investigations of the advanced development (AD), PERSHING II system, including comprehensive laboratory analyses and captive flight tests, have been completed and plans developed for the engineering development (ED) program phase.

Testing of electro-optically guided weapons (TOW, DRAGON, and beamrider concepts) under smoke and aerosol conditions have been conducted with efforts directed toward improved effectiveness in these environments.

Joint Army/Air Force tests have demonstrated the effectiveness of ground-based ECM against aircraft radars (attack, terrain following, terrain avoidance) and the feasibility of passive tracking. Plans are being developed for feasibility hardware systems based on these concepts. Vulnerability assessments of the competitive designs for the Advanced Attack Helicopter's Target Acquisition Designation System/Pilot Night Vision System (TADS/PNVS) have been initiated.

The feasibility of using a structurally sound radar absorbent material was demonstrated through flight tests of a missile scale model. Investigations under the Tri-service Special Electromagnetic Interference (SEMI) program were conducted on several weapons systems and field firing tests demonstrated predicted SEMI effects. Work in this area is being expanded to include other electronics devices and weapons systems (night vision devices and XM-1 tank). Tri-Service ECM analyses and field test on foreign missile systems are continuing and a handbook of susceptibility data on Soviet antitank guided missiles was completed.

Comprehensive and versatile facilities have been established to conduct vulnerability analyses including a dynamic infrared countermeasures simulation laboratory; infrared, radio frequency and radar cross section measurement capabilities; a mobile instrumentation laboratory to support field tests; and a large anechoic chamber for support of SEMI investigations. Emerging technologies such as ultraviolet and millimeter wave applications require continuing upgrade of facilities to maintain reiable EW assessment capabilities.

Project: #D267 Title: Missile Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: Vulnerability investigations will be continued on all Army electronic weapons systems under development to include PATRIOT, ROLAND, STINGER/POST, HELLFIRE, COPPERHEAD, TOW PERSHING I, Improved HAWK, and Division Air Defense (DIVADS). PATRIOT and PERSHING II will enter the engineering development phase and significantly increased electronic countermeasure (ECM) testing and analysis efforts will be provided in support of program decisions. Special Electromagnetic Interference (SEMI) investigations will be conducted on COPPERHEAD, STINGER/POST, and GRAY ROCK missile systems and the AN/TAS-5 night sight. ECM analyses of the Target Acquisition Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter (AAH) and proposed seekers and concepts for close combat weapons will continue. Electronic Warfare (EW) investigation of foreign missiles will be performed at tri-Service and command levels. Facility upgrades include: incorporation of ultraviolet and millimeter wave capabilities into measurement facilities, continuation of design of facility for test of surface target missile seekers, and initiation of automation of SEMI facilities. Unique items of EW equipment required to support ongoing and planned vulnerability analyses will also be developed.

3. FY 1980 Planned Program: The ECM design analysis of PATRIOT will continue with advanced threats integrated, and DT/OT II EW field tests and specification compliance tests will be completed prior to the production decision. STINGER/POST ECM simulations (infrared and ultraviolet) will be initiated and EW assessments of DIVADS competitive candidates will be conducted in support of the selection process.

SEMI investigations will be conducted in the anechoic chamber on COPPERHEAD, GRAY ROCK, and the AN/TAS-5; continued on STINGER/POST; and initiated on HELLFIRE and the XM-1 tank. Infrared, ultraviolet and millimeter signature measurements will be conducted in support of ongoing vulnerability analyses.

The major effort on establishment of the test facility for surface target missiles will be initiated.

4. FY 1981 Planned Program: Assessment of the PATRIOT system vulnerability to the 1987 advanced threat will continue with field testing of hardware and software product improvements. Continued ECM support will be provided to STINGER/POST firing tests, US ROLAND tests, and DIVADS developmental testing. Vulnerability investigations of the all-weather CHAPPARAL, air defense acquisition radars, and radar fuzes for cannon projectiles will be initiated. SEMI investigation on STINGER/POST, HELLFIRE, and the XM-1 tank will be completed and efforts on other electronic devices/systems will be initiated. Continued support to Project Managers will be provided as related to development of advanced seekers for HELLFIRE and COPPERHEAD and follow-on antitank projects. Signature measurements will be continued in support of EW vulnerability analyses. Development of the test facility for surface target missiles will be completed.

5. Program to Completion: This is a continuing program.

Project: #D267 — Title: Missile Vulnerability/Susceptibility

Program Element: #6.37.18.A — Title: Electronic Warfare Vulnerability/Susceptibility

DoD Mission Area: #624 - Other Test and Evaluation Support — Budget Activity: #6 - Defensewide Mission Support

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)						Not Applicable
Funds (as shown in FY 1979 submission)						Not Applicable

The decrease of 1.4M in FY 1980 is due to:

a. Plans for adaptation of existing test equipment that will reduce test instrumentation procurement requirements.

b. Two vulnerability investigations originally planned for FY80 will be delayed.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.38.A
DoD Mission Area: #653 - Training Device Development

Title: Nonsystems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4402	5300	11300	10500	Continuing	Not Applicable
A115	NSTD Infantry	1759	1025	1600	1500	Continuing	Not Applicable
A224	NSTD Armor/Antiarmor	2643	3375	5400	5000	Continuing	Not Applicable
A225	NSTD Artillery/Air Defense/ Engineer	0	600	1600	2000	Continuing	Not Applicable
A226	NSTD Combined Arms	0	300	2700	2000	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program (PE) Element provides for the Advanced Development (AD) of Nonsystems Training Devices (NSTD). Nonsystem Training Devices are developed to support general military training, training on more than one item/system, or several different types of equipment, as compared with System Devices that are developed in support of a specific item/system. The mission of today's Army is to be prepared to fight and defeat a potential adversary having a numerical advantage in both personnel resources and firepower. In addition, the Army must be maintained in a continual state of high readiness. There may be no time to intensify training prior to the opening of hostilities, and no opportunity to loose the first battles and still win the war. At the first shot of a future war, the Army must be totally prepared to fight and win. The combat effectiveness of Army personnel is key to both compensating for the numerical imbalance of opposing forces and for maintaining a ready force. This combat effectiveness can only be achieved by innovative, efficient, and results oriented training. Modern technology, manifested in this instance by modern training devices, can provide the means to accomplish this required training. Prior to technology providing the means, the Army could not realistically simulate battlefield conditions in training and therefore was unable to provide an environment where leaders and soldiers could gain the experience required to survive and win on the modern battlefield. Studies of casualties in World War II, Korea and the Republic of Vietnam conclusively show that probabilities of survival improve dramatically as a function of exposure to enemy action. Training device systems can be expected to partially provide the experience and increased effectiveness previously acquired during the first days of exposure to combat when men and materiel were needlessly lost as personnel and units adjusted to the realities of war. The major thrust in the development of new training devices is to develop devices allowing a high transfer of knowledge and experience from the training situation to a combat situation. The Army must train as it is to fight. The increase in combat effectiveness that can be obtained through the use of appropriate training devices has been demonstrated by REALTRAIN, a first generation engagement simulation system. The effectiveness of REALTRAIN has been validated in numerous field exercises. Studies have indicated that units training with REALTRAIN have become significantly more combat effective than units training with previously standard methods.

Typical statistics within the studies indicate that units trained with REALTRAIN have destroyed 26% more opposing weapons while sustaining 49% fewer casualties. These results reflect progress in meeting the basic challenge of providing learning situations which have the requisite fidelity to require the same decisions and techniques in training as those required in combat. Training devices also offer another potential for improving the effectiveness of the Army. Studies have indicated that, due to the inability to conduct refresher training, the proficiency of individuals and units decrease significantly during periods between field or weapons live-firing exercises. Constrained resources preclude a more frequent occurrence of these activities. Training devices afford the potential to simulate aspects of these activities within garrison locations, using minimal space, time, combat equipment, and personnel. Hence, training devices will provide an effective and efficient means to provide refresher training and thereby maintain combat proficiency at a high level. The overall improved combat effectiveness afforded the Army through the use of appropriate training devices could very well be the determining factor in the outcome of future wars. Improved training devices, now available through modern technology, must continue to be developed to allow the training required to prepare US soldiers to fight outnumbered and win.

C. BASIS FOR FY 1980 RDTE REQUEST: Continue Advanced Development (AD) of the Armor Full Crew Research Simulator (AFCRS) and the Armor Remoted Target System (ARETS). Initiate Advanced Development on Electronic Warfare (EW) simulators.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	5160	5300	9700	Continuing	Not Applicable

The reduced funding in FY 1978 indicated in the current submission reflects the diversion of funds to higher priority programs. The increased funding in FY 1980 reflects refined cost estimates and changes in development schedules, primarily involving the Armor Remoted Target System (ARETS) and Electronic Warfare (EW).

Program Element: #6.37.38.A
DoD Mission Area: #653 - Training Device Development

Title: Nonsystems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Military Construction, Army:						
Funds (current requirements)	0	924	0	0	0	924
Funds (as shown in FY 1979 submission)	0	805	0	0	0	805

The funds indicated above are required to construct facilities at Fort Knox, KY, for the Armor Full Crew Research Simulator (AFCRS) currently under development within this program and reflect a refined cost estimate over the FY 1979 submission.

Program Element: #6.37.38.A
DoD Mission Area: #653 - Training Device Development

Title: Nonsystems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This continuing Program Element provides for the Advanced Development (AD) of training devices which are developed to support general military training, training on more than one item/system, or several different types of equipment. The Program Element is divided into four projects which serve to separate the devices according to the branch of the Army primarily concerned. One or more training devices may be under development within each project. The training devices under development within this Program Element have distinctly different objectives. The first item to be discussed in the FY 1980 program is the Armor Full Crew Research Simulator (AFCRS). Increasing operation and maintenance costs and decreasing availability of suitable training areas limit the amount of training that can be conducted with an actual tank. Additionally, safety and operational requirements preclude using an actual tank under the full range of combat, weather, and trafficability conditions. Simulation technology potentially offers substitutes for the use of the actual vehicle for training. The development of one Armor Full Crew Research Simulator (AFCRS) will provide from current technology a test bed for the purpose of evaluating this technology and its applications to tank crew training to meet and maintain current Army training standards. The simulator will be used to determine the effectiveness of training transfer of tank crew performance from simulators to the actual armored vehicle, and to develop and validate specific requirements for future training device developments. The second system under development in the FY 1980 program is the Armor Remoted Target System (ARETS). Targets represent a major problem area in the current tank gunnery training system. Pop-up, pop-down, and moving targets and target mechanisms have not been centrally developed and are not available through normal training devices supply channels. As a result, armor targets are not available at all required locations to provide effective training. Not only must this situation be remedied, but emphasis must be placed on realistic targets and threat scenarios to allow a high transfer of knowledge and experience from the training situation to a combat situation. The Armor Remoted Target System will provide challenging training under simulated battle conditions in tactical gunnery, including target acquisition and engagement against massed enemy formations portraying threat scenarios. The last development within this Program Element in FY 1980 will provide a currently lacking and extremely important element in creating a realistic environment for training and field exercises. The family of Electronic Warfare (EW) training devices will allow troops to be exposed to a realistic EW environment while accomplishing normal training and field exercises, and will provide feedback to the trainer on troop reaction to the EW. These devices will allow troops to train in the environment in which they will be expected to fight. Communications EW training devices will provide selected disruption of radio communication based on enemy doctrine. Noncommunication EW training devices will provide radar operators with false signals and jamming signals similar to that expected in combat.

G. RELATED ACTIVITIES: Close coordination is maintained with other services through Training and Personnel Technology Conferences, Topical Reveiws, Joint Service Technical Coordinating Group - Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this program element have normally progressed from efforts in Nonsystems Training Devices Exploratory Development (PE 6.27.27.A) and proceed to Nonsystems Training Devices Engineering Development (PE 6.47.15.A). For example, in FY 1980, Electronic Warfare (EW) will progress to this Program Element from Exploratory Development (PE 6.27.27.A). Related Program Elements are: 6.27.22.A, Army Training Technology; 6.37.51.F, Innovation in Education and Training; 6.32.27.F, Advanced Simulation Technology; and 6.37.20.N, Education and Training.

H. WORK PERFORMED BY: Primary contractor for the Armor Full Crew Research Simulator (AFCRS) is General Electric, Daytona Beach, FL. Other contractors have not been determined. In-house activities are performed by the Project Manager for Training Devices (PM TRADE), Orlando, FL; the Naval Training Equipment Center (NTEC), Orlando, FL; and the Army Tank Automotive Research and Development Command, Warren, MI.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Continued Advanced Development (AD) of the Infantry Remoted Target System (IRETS) and the Marksmanship and Gunnery Laser Device (MAGLAD). Initiated AD of the Armor Full Crew Research Simulator (AFCRS) and the Armor Remoted Target System (ARETS).

2. FY 1979 Program: Complete Advanced Development (AD to include Operational Test (OT), of the Infantry Remoted Target System (IRETS) and the Marksmanship and Gunnery Laser Device (MAGLAD). IRETS progresses to Engineering Development in 1980 and MAGLAD progresses to Engineering Development in 1979. Continue AD of the Armor Full Crew Research Simulator (AFCRS) and the Armor Remoted Target System (ARETS).

3. FY 1980 Planned Program: Continue Advanced Development of the Armor Full Crew Research Simulator (AFCRS). The AFCRS will consist of driver, loader, gunner, and tank commander positions integrated by an instructor/evaluator station. The simulator will be configured to simulate the XM1 tank and will allow each crew member, individually, or in any combination with other crew members, to function in a realistic tank environment, subject to scrutiny by a variety of multidisciplined researchers and evaluators. Monitoring systems will provide printout and playback for detailed analysis of soldier performance on an individual and crew member basis. This system will be able to simulate the dynamics of tank crewmen performing tasks under realistic conditions. The AFCRS will provide a capability to develop and validate specific training requirements for future training device developments in the armor field. Complete Advanced Development of the Armor Remoted Target System (ARETS). ARETS is designed to provide an integrated solution to the target needs of the armor community. Components will include control devices, stationary and moving target machanism, 2 and 3 dimensional targets, hostile fire simulators, muzzle flash simulators, and hit indicators. ARETS will be designed to sense and subsequently score service ammunition and laser energy. The control unit will be capable of automatic scoring and recording so that accurate and complete evaluation can be accomplished. Initiate and complete Advanced Development of Electronic Warfare (EW) simulators. The EW training devices are a family of devices dealing with the various aspects of EW in a tactical environment. Communications devices include an automatic signal jammer to emulate threat technical and doctrinal capabilities, a transmission timer/counter to provide feedback to commanders on radio usage, a voice activated audio recorder for event reconstruction and after-action feedback on radio communications, and a power amplifier for effective jamming over an extended area. Noncommunications devices include a corner-cube reflecter and radar signal jammer. ARETS and EW will progress to Engineering Development in 1981.

4. FY 1981 Planned Program: Complete the design and engineering effort on the Armor Full Crew Research Simulator (AFCRS). Install the AFCRS at Ft Knox, KY, and begin operational testing.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #A224 Title: NSTD Armor/Antiarmor
Program Element: #6.37.38.A Title: Nonsystems Training Device (NSTD) Development
DoD Mission Area: #653 - Training Device Development Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: This continuing project provides for the Advanced Development (AD) of armor/antiarmor related training devices that are developed to support general military training, training on more than one item/system, or several different types of equipment. One or more training devices may be under development within this project. Two devices are under development in the FY 1980 program. The first item to be discussed in the FY 1980 program is the Armor Full Crew Research Simulator (AFCRS). Increasing operation and maintenance costs and decreasing availability of suitable training areas limit the amount of training that can be conducted with an actual tank. Additionally, safety and operational requirements preclude using an actual tank under the full range of combat, weather, and trafficability conditions. Simulation technology potentially offers substitutes for the use of the actual vehicle for training. The development of one Armor Full Crew Research Simulator (AFCRS) will provide from current technology a test bed for the purpose of evaluating this technology and its applications to tank crew training to meet and maintain current Army training standards. The simulator will be used to determine the effectiveness of training transfer of tank crew performance from simulators to the actual armored vehicle, and to develop and validate specific requirements for future training device developments. The second system under development in the FY 1980 program is the Armor Remoted Target System (ARETS). Targets represent a major problem area in the current tank gunnery training system. Pop-up, pop-down, and moving targets and target mechanisms have not been centrally developed and are not available through normal training devices supply channels. As a result, armor targets are not available at all required locations to provide effective training. Not only must this situation be remedied, but emphasis must be placed on realistic targets and threat scenarios to allow a high transfer of knowledge and experience from the training situation to a combat situation. The Armor Remoted Target System will provide challenging training under simulated battle conditions in tactical gunnery, including target acquisition and engagement against massed enemy formations portraying threat scenarios.

B. RELATED ACTIVITIES: Close coordination is maintained with other services through Training and Personnel Technology Conferences, Topical Reviews, Joint Service Technical Coordinating Group - Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the Office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this project have normally progressed from efforts in Nonsystems Training Devices Exploratory Development (PE 6.27.27.A) and proceed to Nonsystems Training Devices Engineering Development (PE 6.47.15.A). Related program elements are: 6.27.22.A, Army Training Technology; 6.37.51.F, Innovation in Education and Training; 6.32.27.F, Advanced Simulation Technology; and 6.37.20.N, Education and Training.

C. WORK PERFORMED BY: Primary contractor for the Armor Full Crew Research Simulator is General Electric, Daytona Beach, FL. Other contractors have not been determined. In-house activities are performed by the Project Manager for Training Devices (PM TRADE), Orlando, FL; the Naval Training Equipment Center (NTEC), Orlando, FL; and the Army Tank Automotive Research and Development Command, Warren, MI.

Project: #A224 Title: NSTD Armor/Antiarmor
Program Element: #6.37.38.A Title: Nonsystems Training Device (NSTD) Development
DoD Mission Area: #653 - Training Device Development Budget Activity: #6 - Defensewide Mission Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Initiate Advanced Development (AD) of the Armor Full Crew Research Simulator (AFCRS) and the Armor Remoted Target System (ARETS).

2. FY 1979 Program: Continue AD of the Armor Full Crew Research Simulator (AFCRS) and the Armor Remoted Target System (ARETS).

3. FY 1980 Planned Program: Continue Advanced Development of the Armor Full Crew Research Simulator (AFCRS). The AFCRS will consist of driver, loader, gunner, and tank commander positions integrated by an instructor/evaluator system. The simulator will be configured to simulate the XM1 tank and will allow each crew member, individually, or in any combination with other crew members, to function in a realistic tank environment, subject to scrutiny by a variety of multidisciplined researchers and evaluators. Monitoring systems will provide printout and playback for detailed analysis of soldier performance on an individual and crew member basis. This system will be able to simulate the dynamics of tank crewmen performing tasks under realistic conditions. The AFCRS will provide a capability to develop and validate specific requirements for future training device developments in the armor field. Complete Advanced Development of the Armor Remoted Target System (ARETS). ARETS is designed to provide an integrated solution to the target needs of the armor community. Components will include control devices, stationary and moving target mechanisms, 2 and 3 dimensional targets, hostile fire simulators, muzzle flash simulators, and hit indicators. ARETS will be designed to sense and subsequently score service ammunition and laser energy. The control unit will be capable of automatic scoring and recording so that accurate and complete evaluation can be accomplished. ARETS will progress to Engineering Development in 1981.

4. FY 1981 Planned Program: Complete the design and engineering effort on the Armor Full Crew Research Simulator (AFCRS). Install the AFCRS at Ft Knox, KY, and begin operational testing.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

Project: #A224 Title: NSTD Armor/Antiarmor

Program Element: #6.37.38.A Title: Nonsystems Training Device (NSTD) Development

DoD Mission Area: #653 - Training Device Development Budget Activity: #6 - Defensewide Mission Support

/. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2643	3375	5400	5000	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	4066*	3375	3000		Continuing	Not Applicable
Other Appropriations:						
Military Construction, Army						
Funds (current requirements)	0	924	0	0	0	924
Funds (as shown in FY 1979 submission)	0	805**	0		0	805

* The reduced funding in FY 1978 indicated in the current submission reflects the diversion of funds to higher priority Program Elements. The increased funding in FY 1980 reflects refined cost estimates and changes in the requirement/priorities within the NSTD program.

** The funds indicated are required to construct facilities at Ft Knox, KY, for the Armor Full Crew Research Simulator (AFCRS) currently under development within this project and reflect a refined cost estimate over the FY 1979 submission.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.47.A
DoD Mission Area: #221 - Medicine & Life Science

Title: Soldier Support/Survivability
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1419	2000	3415	6321	Continuing	Not Applicable
D610	Food Advanced Development	809	473	1045	2225	Continuing	Not Applicable
D669	Clothing and Equipment	610	1527	2370	4096	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Deficiencies currently exist in meeting the daily basic needs of the individual soldier in protecting him/her against environmental extremes and ever increasing lethality of battlefield hazards. Also, there is a continuing need to guarantee nutritional value and "soldier acceptance" of rations. This program is designed to satisfy these functional needs. New items of clothing, individual equipment, and field service support equipment will improve the comfort and survivability prospects of the individual soldier through: better cold and hot weather protective clothing; individual equipment for protection against noise attenuation, nuclear flash, chemical and biological agents; up-graded working conditions; and improved personal daily hygiene. New food processing techniques and feeding methods ensure a responsive food system anywhere in the worldwide military mission areas outside the sphere of the CONUS commercial food distribution system. Overall emphasis in food development is to minimize food procurement cost and reduce where possible logistic support requirements.

C. BASIS FOR FY 1980 RDTE REQUEST: Items listed in this program are essential to improving the combat effectiveness of the soldier, fill gaps that exist in the soldier's compatibility with new weapons systems, and increase his efficiency and morale in the field. Prototype items and concepts will be developed to generate preliminary data relative to producibility, cost, and capability of prototypes to meet a defined use and need and/or threat. Program allows for generation of projected life cycle cost and evaluation by developer and user prior to the decision to enter full scale development. The food research requirements provide for advanced development of items of food and equipment for the Army, Navy, Air Force, Marine Corps, and Defense Logistics Agency and constitutes a part of the DOD Food Research, Development, Testing, and Engineering (RDT&ENG) Program managed by the Army as executive agency.

Program Element: #6.37.47.A
DoD Mission Area: #221 - Medicine & Life Science

Title: Soldier Support/Survivability
Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submissions)	1797	2527	3920	Continuing	Not Applicable
D610 - Food Advanced Development	1162	1000	1550	Continuing	Not Applicable
D669 - Clothing and Equipment	635	1527	2370	Continuing	Not Applicable

Changes between profiles shown in FY79 and 80 Congressional Descriptive Summaries reflect Congressional action which decreased the FY79 request for Project D610, Food Advanced Development. This created a backlog of items scheduled for AD, some of which have been deferred until FY81. The Services have not withdrawn requirements for food items and equipment placed upon the Army as executive agent for management of the DOD Food RDT&Eng Program.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

F. DETAILED BACKGROUND AND DESCRIPTION: This program element contains two soldier support-oriented projects which prior to the FY 1978 RDTE Descriptive Summary were carried in Program Element 6.37.26.A, Combat Support Equipment. These projects include food, clothing, and related personal and protective equipment for the individual soldier. A major effort, which started in FY 1979, will be the continuation of development of a ballistic helmet, with sound attenuation, and other protective clothing items for combat vehicle crewmembers. Department of Defense (DOD) assigned the Army overall responsibility for the DOD Food Research, Development, Testing and Engineering (RDT&ENG) program to the Army. This includes efforts to respond to DOD and other Services requirements relative to their specific operational needs for food and food service equipment, as well as to address jointly those needs which are common to two or more Services. Allocation of funds to the various food program efforts is based on priorities assigned by the Joint Formulation Board comprised of representatives from all Services.

G. RELATED ACTIVITIES: Each of the Military Services performs work to develop their Service-peculiar items of clothing and equipment. Close coordination is maintained, through joint working groups, joint Service agreements and circulation of requirement documents; many of the items developed under this program are used by other Services. Work in clothing and individual equipment is also performed in Program Element (PE) 6.27.23A, Clothing, Equipment, and Shelter Technology; and in Project DL40, Clothing and Equipment and in Project DL42, Personnel Armor System of PE 6.47.13.A, Combat Feeding, Clothing and Equipment. Food research is a coordinated joint Service effort and related work is conducted in PE 6.27.24.A, Food Technology; Project DL47, Wholesomeness Testing of Irradiated Foods and Project D548, Military Subsistence System of PE 6.47.13.A, Combat Feeding, Clothing and Equipment. Basic research in support of both the food and clothing programs is done in Project AH52, Research in Support Equipment of Individual Soldier of PE 6.11.02.A, Defense Research Sciences.

H. WORK PERFORMED BY: In-house work in this program is performed by the US Army Research and Development Command, Natick, MA; US Army Human Engineering Laboratory, Aberdeen Proving Ground, MD; US Army Research Institute of Environmental Medicine, Natick, MA; US Army Aero-medical Research Laboratory, Fort Rucker, AL; US Army Electronics Research and Development Command, Fort Monmouth, NJ; and US Department of Agriculture Stored Products and Insects Research and Development Laboratory, Savannah, GA. Potential contractors include Ro-Search Corp., Waynesville, NC; Gentex Corp., Carbondale, PA; Geonautics, Inc, Newburyport, MA; Hamilton Standard, Hartford, CN; and Applied Design Corp, Tanawanda, NY. Contracts are valued at $360,000.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Advanced Development (AD) was completed on a cold-dry uniform (parka and trousers) and on water impermeable/vapor permeable rainwear. The Combat Vehicle Crewman (CVC) Clothing System was designed, fabricated, and transferred to Engineering Development. Prototype combat boots were received from the contractor and evaluated. Structural design analysis was completed for transportable helicopter enclosure. A prototype general purpose tent was fabricated. AD of a continuous flow bakery system to replace obsolete World War II field bakeries in inventory was continued. A contract was let for design and fabrication of bread slicing and bagging units. A food Sanitation Center was evaluated and recommended for Development

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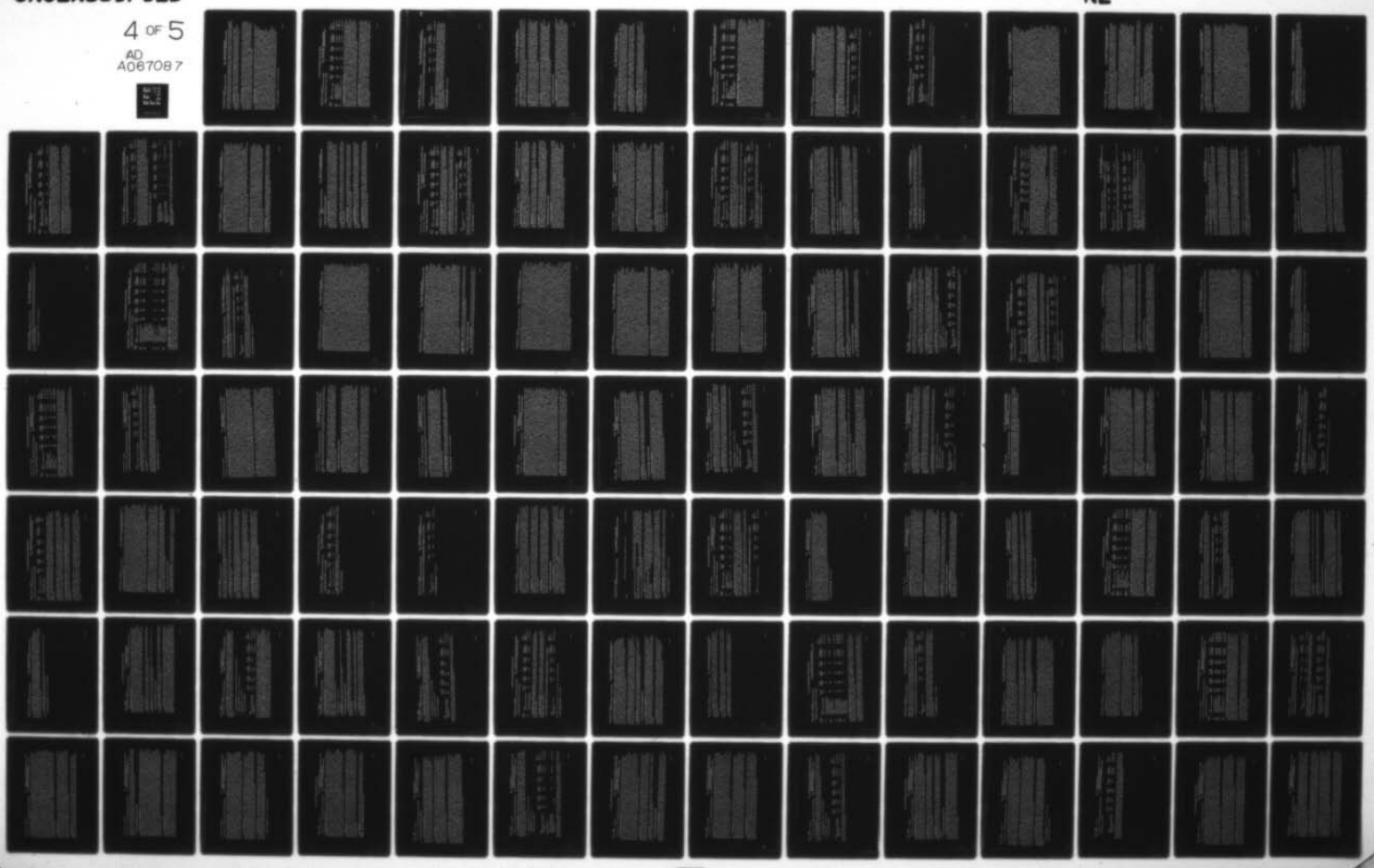

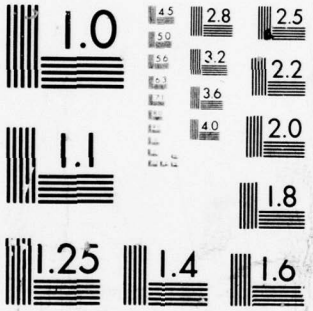

MICROCOPY RESOLUTION TEST CHART
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Acceptance (DEVA) In-Process Review (IPR) and Type Classification (TC). Energy conservation study determined methods to significantly reduce energy consumption in FOF garrison dining facilities and results were provided to all the Services for implementation. New subsistence items showning substantial savings in procurement costs were introduced into the subsistence supply system.

2. FY 1979 Program: Initiate AD efforts and various design studies for Combat Vehicle Crewman (CVC)/Artilleryman ballistic/noise attenuative helmet. Award contract for prototype ballistic eye protection device and molds. Continue development and process definition of special items of subsistence to overcome unique military requirements such as limited shipboard storage space and increased packaging protection to prevent subsistence losses in subsistance warehouses in overseas mission areas.

3. FY 1980 Planned Program: Continue efforts on CVC/Artilleryman helmet initiated in FY 1979. Complete systems analysis and definition of medical design constraints. Initiate both helmet prototype fabrication contracts and contract for mold design validation. Evaluate prototype designs of ballistic eye protection and award contract for modified prototypes for Development Test I. Award contract for prototype combat footwear for aircraft personnel. Initiate AD on modular cooling system for use with chemical/biological (CB) clothing. Initiate work to obtain a nonwoven material with improved capacity, uniformity of web, air permeability, and reduced flammability for application to soft shelters (tentage). Complete AD of military subsistence items for which there are no commercial equivalents. Continue AD of field food service equipment, continue development of methods to control insect damage to subsistence in overseas warehouses for Defense Logistics Agency.

4. FY 1981 Planned Program: Complete AD efforts in conjunction with CVC/Artilleryman helmet, hold a Validation IPR and move to Engineering Development. Conduct Development Test I/Operational Test I (DT I/OT I) on ballistic eye protection. Evaluate prototype aircraft boots, modify as necessary and award contract for design verified prototypes. Continue AD effort, testing and evaluation of prototype novel shelter materials. Conduct DT I/OT I on CB modular cooling system for use with protective clothing items. Procure experimental models of modified ventilative/evaporative cooling system prototypes for use in combat vehicles and conduct mission compatibility test in a CB defense mode. Concentrating on cold/wet environment, initiate studies to fabricate prototype arctic clothing and equipment which will reduce total number of components while enhancing protective qualities. Conduct insulation studies of most promising concepts/ candidates of heated handwear. Fabricate prototype lightweight CB gloves for in-house test and evaluation. Initiate efforts to determine extent of man/machine incompatibility caused by clothing, handwear and footwear in aircraft. Conduct field evaluation, physiological and human engineering studies of most promising commercial and foreign over-snow, mountaineering and load carrying equipment. Continue AD of field food service equipment to replace obsolecent Army, Air Force and Marine Corps with particular emphasis on food service systems which compliment and support the highly mobile weapon systems being introduced into the combat forces. Approximately one-half the funds in the clothing and equipment program in FY 1980 were directed toward the CVC/Artillery man helmet. The substantial increase in funds in FY 1981 represent an effort to complete AD of CVC/Artillery man helmet while adequately addressing other programs.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.13.A
DoD Mission Area: #654 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3343	1385	4529	5334	Continuing	Not Applicable
DL40	Clothing and Equipment	342	512	1030	2000	Continuing	Not Applicable
DL42	Personnel Armor System	443	250	0	0	0	3603
DL47	Wholesomeness Testing of Irradiated Foods	2350	273	2499	2134	Continuing	Not Applicable
DS48	Military Subsistence Systems	208	350	1000	1200	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Success on the battlefield is directly related to the individual soldier's effectiveness and survivability. This program plans for the correction and improvement of that part of the combat support system which provides for the basic needs of the individual soldier: food, clothing, shelter, chemical, biological, and ballistic protection. It also includes the development and improvement of special items of individual clothing and equipment required for operations in extremes of terrain and climate, e.g., mountain climbing, snow, and surface swimming gear; the improvement of field food service equipment, fabric field shelters, field service equipment, field printing equipment, and conduct of wholesomeness testing of irradiated foods. Also provides for the evaluation of domestic and foreign food service equipment for effectiveness in military food system requirements to avoid the expense of research and development. This request provides for Navy, Air Force, and Marine Corps food service research requirements as part of the DOD Food Research, Development, Testing, and Engineering (RDT&Eng) Program managed by the Army for all the Services and the Defense Logistics Agency (DLA).

C. BASIS FOR FY 1980 RDTE REQUEST: This request provides for correction of known deficiencies in items of individual clothing and equipment and allows the completion of engineering development items previously started in other programs. The improvements planned under this program will incorporate the latest developments in material and equipment design and are expected to significantly increase individual combat efficiency under the diverse geographical and climatological battlefield conditions expected in future areas of operations. Food service developments in this and related program elements (PE's) provide for more efficient (and cost effective) provision of this vital element of life support systems for all the Services under conditions of peacetime training, emergency deployment, and combat. The work to be performed under this request allows for exploitation of methods, materials, and capabilities developed under related basic research programs and deemed suitable for engineering development prior to adoption as standard.

Program Element: #6.47.13.A
DoD Mission Area: #654 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	5203	1385	3080	Continuing	Not Applicable

The fluctuations in this program are primarily due to change in the funding level of Project DL47, Wholesomeness Testing of Irradiated Foods. FY77 and 78 levels were based on wholesomeness testing of irradiated beef, ham, pork, and chicken. Default of the beef, ham, and pork testing contractor led to a review of the total program and a decision to limit future testing to irradiated chicken only, as recommended by the Government Accounting Office. The FY79 request was reduced significantly while decisions were being made. The FY80 request reflects only those funds required to continue the current chicken test. Minor changes were also caused by an Army decision to defer work being done in Project DL40 and by the completion of the personnel armor system in Project DL42.

E. OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.47.13.A
DoD Mission Area: #654 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program provides for the development of individual combat protective clothing and equipment to increase combat efficiency and provide protection for the combat soldier against battlefield hazards and the natural environment. It also includes the development of operational rations and food service equipment; wholesomeness testing of irradiated foods; and develops improved field shelters. There are four projects within this program element (PE) which directly affect the soldier's safety, effectiveness, comfort, and survivability.

G. RELATED ACTIVITIES: Each of the military Services performs work to develop their Service-peculiar items of clothing and equipment; however, close coordination is maintained, and many of the items developed under this program are used by all Services. The Army has overall responsibility for the Department of Defense (DOD) Food Research, Development, Testing, and Engineering (RDT&Eng) Program, which includes specific efforts to respond to DOD and other Services' requirements. Work in clothing and equipment is also performed in PE 6.27.23.A, Clothing, Equipment, and Shelter Technology, and in Project D669, Clothing and Equipment in PE 6.37.26.A, Combat Support Equipment. Work in food is conducted in Project AH52, Research in Support Equipment of Individual Soldier; in PE 6.11.02.A, Defense Research Sciences; in PE 6.27.24.A, Food Technology; and in Project D610, Food Advanced Development in PE 6.37.47.A, Soldier Support/Survivability.

H. WORK PERFORMED BY: The US Army Natick Research and Development Command at Natick, MA, performs the majority of in-house efforts. The US Army Medical Research and Development Command, Ft Detrick, MD, administers the wholesomeness feeding test contract for irradiated chicken with Ralston/Purina, St. Louis, MO. Additional potential contractors for other elements of this PE are Digital Equipment Corporation, Maynard, MA; E. I. DuPont, Wilmington, DE; Kings Seeley Co, Norwick, CN; RoSearch Inc., Waynesville, NC. Other Government facilities involved are US Army Human Engineering and Chemical Systems Laboratories, Aberdeen Proving Ground, MD; US Army Test and Evaluation Command, Aberdeen Proving Ground, MD; US Army Cold Regions Test Center, Fort Greely, AL; Lettermen Army Institute of Research, San Francisco, CA; US Army Research Institute of Environmental Medicine, Natick, MA. Estimated value of contracts is $1.250 million.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Completed Development Test II/Operational Test II (DT II/OT II) on the Personnel Armor System (Infantry Helmet and Fragmentation Vest), and adapted the system as standard equipment to replace what is essentially World War II (WW II) and Korean War vintage equipment. Contracted for ski mountain boot for DT II/OT II testing and held Development Acceptance In-Process Review (DEVA IPR) for Phase I Combat Vehicle Crewman (CVC) Clothing System (includes one-piece hot-weather coverall, jacket and summer gloves). Procured aircraft cold-weather sleeping bag for DT II/OT II. Contract let for fabrication of United States Marine Corps (USMC) field refrigeration unit to meet International Organization for Standardization (ISO) standard container dimensions. Commercial segment equipment (rotary ovens and continuous grill) was evaluated and essential performance characteristics provided to the Services for use in equiping military dining facilities; wholesomeness testing of irradiated chicken meat by contract was continued in accordance with the decision to limit future Army work to demonstration of wholesomeness of a single meat item.

Program Element: #6.47.13.A
DoD Mission Area: #654 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: Initiate Engineering Development (ED) of Phase II of Combat Vehicle Crewman (CVC) Clothing System, which consists of coverall liner, insulated NOMEX balaclava protective face mask, ballistic shell for DH-132 helmet, summer and winter leather boots, and standard overboots with modified closure. Initiate ED of battledress camouflage uniform. Continue ED on Personnel Armor System to develop a helmet for wear by servicewomen (an additional helmet size, extra small, may be required to be added to the three sizes adopted as standard in 1978). Initiate short term improvements to field food preparation equipment and continue to evaluate commercial equipment for possible use in Department of Defense (DOD) military dining facilities.

3. FY 1980 Planned Program: Hold Development Acceptance In-Process Review (DEVA IPR) and type classify (TC) battledress camouflage uniform for moderate temperature zones. Complete Development Test II/Operational Test II (DT II/OT II) on Phase II CVC Clothing System and hold DEVA IPR. Complete ED on ski mountain boot. Continue short term improvements to Army and United States Marine Corps (USMC) field food service equipment. Evaluate foreign and commercial equipment. Complete ED on food service equipment for military Services.

4. FY 1981 Planned Program: Complete ED on battledress uniform. Conduct DT II/OT II on Infantry combat boot and complete ED. Award contract for arctic canteen for DT II/OT II. Initiate ED on extreme cold weather flying gloves. Initiate ED of chart overlay copier and conduct DT II/OT II. Initiate ED on transportable helicopter enclosure and award contract for DT II/OT II items. Finalize design of general purpose (GP) tentage. Initiate ED of continuous flow bakery system for Army and Marine Corps leading to DEVA IPR and type classification. Initiate ED on improved heating sources to include use of alternative fuels.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.15.A
DoD Mission Area: #653 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8148	10006	9416	16100	Continuing	Not Applicable
D237	NSTD Artillery/Air Defense/ Engineer	700	2550	4000	3000	Continuing	Not Applicable
D239	NSTD Infantry	2872	1350	400	4500	Continuing	Not Applicable
D241	NSTD Combined Arms	2244	2820	2000	4000	Continuing	Not Applicable
D572	NSTD Armor/Antiarmor	1538	2436	1016	2000	Continuing	Not Applicable
D573	Army Support Naval Training Equipment Center (NTEC)	794	850	2000	2600	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element (PE) provides for the Engineering Development (ED) of Nonsystems Training Devices (NSTD). Nonsystems Training Devices are developed to support general military training, training on more than one item/system, or several different types of equipment, as compared with System Devices that are developed in support of a specific item/system. The mission of today's Army is to be prepared to fight and defeat a potential adversary having a numerical advantage in both personnel resources and firepower. In addition, the Army must be maintained in a continual state of high readiness. There may be no time to intensify training prior to the opening of hostilities, and no opportunity to loose the first battles and still win the war. At the first shot of a future war, the Army must be totally prepared to fight and win. The combat effectiveness of Army personnel is key to both compensating for the numerical imbalance of opposing forces and for maintaining a ready force. This combat effectiveness can only be achieved by innovative, efficient, and results oriented training. Modern technology, manifested in this instance by modern training devices, can provide the means to accomplish this required training. Prior to technology providing the means, the Army could not realistically simulate battlefield conditions in training and, therefore, was unable to provide an environment where leaders and soldier could gain the experience required to survive and win on the modern battlefield. Studies of casualties in World War II, Korea, and the Republic of Vietnam conclusively show that probabilities of survival improve dramatically as a function of exposure to enemy action. Training device systems can be expected to partially provide the experience and increased effectiveness previously acquired during the first days of exposure to combat when men and materiel were needlessly lost as personnel and units adjusted to the realities of war. The major thrust in the development of new training devices is to develop devices allowing a high transfer of knowledge and experience from the training situation to a combat situation. The Army must train as it is to fight. The increase in combat effectiveness that can be obtained through the use of appropriate training devices has been demonstrated by REALTRAIN, a first generation engagement

simulation system. The effectiveness of REALTRAIN has been validated in numerous field exercises. Studies have indicated that units training with REALTRAIN have become significantly more combat effective than units training with previously standard methods. Typical statistics within the studies indicate that units trained with REALTRAIN have destroyed 26% more opposing weapons while sustaining 49% fewer casualties. These results reflect progress in meeting the basic challenge of providing learning situations which have the requisite fidelity to require the same decisions and techniques in training as those required in combat. Training devices also offer another potential for improving the effectiveness of the Army. Studies have indicated that, due to the inability to conduct refresher training, the proficiency of individuals and units decreases significantly during periods between field or weapons live-firing exercises. Constrained resources preclude a more frequent occurance of these activities. Training devices afford the potential to simulate aspects of those activities within garrison locations, using minimal space, time, combat equipment, and personnel. Hence, training devices will provide an effective and efficient means to provide refresher training and thereby maintain combat proficiency at a high level. The overall improved combat effectiveness afforded the Army through the use of appropriate training devices could very well be the determining factor in the outcome of future wars. Improved training devices, now available through modern technology, must continue to be developed to allow the training required to prepare US soldiers to fight outnumbered and win.

C. BASIS FOR FY 1980 RDTE REQUEST: Provides funds to support the personnel costs of the Office of the Project Manager for Training Devices (PM TRADE), the agency responsible for executing the Army Non-Systems Training Devices (NSTD) program. Continues funding a joint Army/Navy agreement which makes available for Army use the resources of the Naval Training Equipment Center (NTEC), which is collocated with PM TRADE. Initiates Engineering Development (ED) of the following: Air-Ground Engagement Systems (AGES), Air Defense Simulator (ADS), Blank Firing Adapter (BFA) for the M240 machine gun, Weapons Effect Technology (WET), Army Training Battle Simulation System (ARTBASS), and the Infantry Remoted Target System (IRETS). Continue ED on the Marksmanship and Gunnery Laser Device (MAGLAD).

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	8192	10006	12916	Continuing	Not Applicable

The reduced funding for FY 1980 reflected in the current submission is due to the diversion of funds to higher priority programs.

Program Element: #6.47.15.A
DoD Mission Area: #653 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #2 - Defensewide Mission Support

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	13100	32800	49500	70200	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	12600	32800	50700		Continuing	Not Applicable
Quantities*						

* It is not feasible to list the quantities because of the diversity of type and quantity of the different training devices.

The increased procurement for FY 1978 over the previous estimate reflects an increased requirement for stationary tank targets. The reduced estimate in FY 1980 reflects a refined cost estimate.

Program Element: #6.47.15.A
DoD Mission Area: #653 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #2 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program provides for the Engineering Development (ED) of training devices which are developed to support general military training, training on more than one item/system, or several different types of equipment. The Program Element is divided into five projects, four of which serve to separate the training devices according to the branch of the Army primarily concerned, and one of which provides funds to support the personnel costs of the Office of the Project Manager for Training Devices (PM TRADE) and to continue funding a joint Army/Navy agreement which makes available for Army use the resources of the Naval Training Equipment Center (NTEC). One or more training devices are under development within each project. The training devices encompassed within this Program Element in FY 1980 may be categorized into three general areas. The first area is engagement simulation. The purpose of engagement simulation is to create a training environment which realistically simulates an actual battlefield. Only in this way can soldiers be effectively trained to fight and survive on the modern battlefield. To simulate an actual battlefield, devices are required which allow a two-sided, free play field exercise with real time casualty assessment. The Multiple Integrated Laser Engagement System (MILES) completed development in FY 1978 and initial procurement is scheduled for FY 1979. MILES is a tactical engagement simulation system which employs eyesafe lasers to realistically simulate the firing capabilities of rifles, machine guns, and armor/antiarmor weapons. The system provides real time casualty assessment. Currently lacking in this engagement simulation system are two key elements in the combined arms team, air-to-ground weapons and air defense weapons. Simulators for these two types of weapon systems will be developed within this Program Element. The Air-Ground Engagement System (AGES) will provide a realistic means of simulating helicopter and ground support aircraft operations during tactical training and the Air Defense Simulator (ADS) will provide a realistic means of simulating air defense measures against helicopters and low performance aircraft. A third device under development to support engagement simulation exercises as well as other training is a Blank Firing Adapter (BFA) for the 7.62mm, M240 (MAG 58) machine gun. This device will allow the coaxial machine gun mounted on the main battle tank to be used in engagement simulation exercises, thereby increasing the training effectiveness of these exercises. The last development under this Program Element in support of engagement simulation is an effort specifically designed to avoid some of the costs associated with engagement simulation. This program will provide devices giving realistic cues of weapons effects (noise, blast, smoke, recoil, flash) to replace the currently required blank ammunition. This development has the potential for significant cost avoidance during engagement simulation exercises. The second general area encompassed by this Program Element is for devices that aid in the training of command groups. The modern battlefield is extremely complex. The commander and his staff have an array of weapon systems, information gathering systems, communications systems, and mobility/countermobility systems at his disposal. To win the battle, these systems must be integrated and used in an optimum manner. The skills required to coordinate and direct operations on the modern battlefield can only be acquired through realistic training. The Army Training Battle Simulation System (ARTBASS) will allow the training of leaders and staffs in the critical aspects of combined arms employment without the requirement for deploying large troop units to the field. The ARTBASS will provide a two-sided, free play, highly realistic, real time environment in which to train commanders and their staffs. The third general area encompassed by this Program Element concerns marksmanship systems. The Army's standard target mechanisms for fixed infantry marksmanship ranges are rapidly becoming obsolete. Most are maintenance liabilities and not cost effective due to repair costs and lost training time. Range control

systems are likewise antiquated. The Infantry Remoted Target System (IRETS) will provide a modern, realistic, threat oriented solution to the small arms marksmanship target needs of the infantry community. A second marksmanship device under development is the Marksmanship and Gunnery Laser Device (MAGLAD). This program encompasses the development of a self-contained laser device which is attached to and accurately simulates the firing characteristics of the M16A1 rifle. This device can be used either on reduced scale indoor ranges, or on full scale ranges when used in conjunction with IRETS. This device will offer a cost effective means to improve marksmanship training.

G. RELATED ACTIVITIES: Close coordination is maintained with other Services through Training and Personnel Technology Conferences, Topical Reviews, Joint Service Technical Coordinating Group-Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the Office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this program element have normally progressed to Engineering Development from related Nonsystem Training Devices Advanced Development (Program Element (PE) 6.37.38.A) and/or Nonsystems Training Devices Exploratory Development (PE 6.27.27.A). For example, in FY 1980 the following devices will progress to this Program Element from Exploratory Development, PE 6.27.27.A: Air Defense Simulator (ADS), Air-Ground Engagement System (AGES), and Weapons Effect Technology (WET), Related Program Elements are 6.42.17.A, Synthetic Flight Training Systems; 6.42.27.F, Flight Simulator Development; and 6.47.03.N, Training Device Prototype Development. In FY 1980 funds supporting the personnel costs of the Office of the Project Manager for Training Devices were moved within this Program Element from project D241 to project D573 to consolidate all support costs within one project. This Program Element also funds a joint Service agreement that makes available for Army use the resources of the NTEC, which is collocated with PM TRADE.

H. WORK PERFORMED BY: Primary contractors: Xerox Electro-Optical Systems, Inc., Pasadena, CA; and Sperry Rand Corp., Huntsville, AL. Over $7 million is programed for competitive bid contracts. In-house activities are performed by the PM TRADE, Orlando, FL; the Army Armament Research and Development Command, Picatinny Arsenal, Dover, NJ; and the Naval Training Equipment Center, Orlando, FL.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Completed development of the M31 Artillery Trainer, the Artillery Direct Fire Trainer, the Combined Arms Tactical Training Simulator, the Miniature Moving Target, the .22 Caliber Rimfire Adapter for the M16 Rifle, the Caliber .50 Subcaliber Training Devices for the 90mm and 105mm Tank Guns, and the Blank Fire Adapter for the M85 Machine Gun. All of the above devices have been fielded. Completed engineering, fabrication, development, and operational testing of the Observed Fire Trainer. Completed engineering, fabrication, development testing and initiated operational testing of the Multiple Integrated Laser Engagement System (MILES) and the Antitank Weapons Signature Simulator (ATWESS). The results of development testing indicated a successful development.

2. FY 1979 Program: Complete operational testing and type classification and initiate procurement of the various components of the Multiple Integrated Laser Engagement System (MILES) and the Antitank Weapons Signature Simulator (ATWESS). Type classify and initiate procurement of the Observed Fire Trainer. Initiate Engineering Development of the Marksmanship and Gunnery Laser Device (MAGLAD), progressing from Advanced Development in Program Element (PE) 6.37.38.A. Complete Engineering Development (ED) of the Combat Vehicle Kill Indicator-Pyrotechnic Device (CVKI-PD) and the Blank Firing Adapter (BFA) for the .50 caliber M2 machine gun.

3. FY 1980 Planned Program: Initiate ED of the Air-Ground Engagement Systems (AGES). The development of these systems will allow the introduction of air weapons into tactical engagement simulation exercises. The objective is to provide a realistic means of simulating helicopter and ground support aircraft operations during the course of tactical training by the inclusion of real time casualty assessment in combined arms exercises. The air-to-ground weapons simulated will include TOW, HELLFIRE, 20/30mm machine guns, and other air delivered munitions. Initiate ED of the Army Training Battle Simulation System (ARTBASS). This device will allow the training of leaders and staffs to cope with the complex and sophisticated environments they will face in future battlefields. The ARTBASS will provide a two sided, free play, highly realistic, real time environment. It will incorporate such features as varied terrain, accurate portrayal of both friendly and enemy weapons effects, and diagnostic feedback, while using a minimum number of dedicated controllers. Initiate ED of Air Defense Simulators (ADS). This program will provide laser systems to simulate the firing characteristics of the CHAPARRAL, VULCAN, REDEYE, and STINGER air defense weapons. The objective is to provide a realistic means of simulating air defense measures against helicopters and ground support aircraft and allow the inclusion of real time casualty assessment in combined arms exercises. Initiate ED of Weapons Effect Technology (WET). This program will provide a replacement for the blank ammunition currently required in engagement simulation exercises and hence, offers an avoidance of training ammunition costs currently associated with these programs. These devices will produce the realistic weapons effects (noise, blast, recoil, flash) necessary to cause troops in training to react as they would to actual weapons effects in combat. Initiate ED of the Blank Firing Adapter (BFA) for the 7.62mm M240 (MAG 58) machine gun. The M240 is the coaxial machine gun mounted on the main battle tank. The BFA will allow this machine gun to fire blank ammunition and hence play its full role in engagement simulation exercises, as it would in actual combat, thereby increasing the training effectiveness of the exercises. Initiate and complete ED of the Infantry Remoted Target System (IRETS). This program will provide an integrated solution to the small arms marksmanship target needs of the infantry community. IRETS will feature automated control devices, stantionary and moving target mechanisms, 2 and 3 dimensional targets, hostile fire simulators, and hit indicators. This target system will provide a realistic threat scenario and allow a high transfer of training value to a combat situation. Complete ED of the Marksmanship and Gunnery Laser Device (MAGLAD). This device, which simulates the firing characteristics of the M16A1 rifle, will supplement life-fire marksmanship training in a cost-effective manner, and allow marksmanship training to be conducted without the requirements for normal range facilities. Concerning all the devices above, all the experimental work will be performed and the proposed systems will be ready for full scale development.

Program Element: #6.47.15.A
DoD Mission Area: #653 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #2 - Defensewide Mission Support

4. FY 1981 Planned Program: Complete Engineering Development (ED) and testing of the Air-Ground ENgagement System (AGES), Air Defense Simulators (ADS), Blank Firing Adapter (BFA) for the M240 machine gun, and Weapons Effect Technology (WET). Continue ED on the Army Training Battle Simulation System. Initiate and complete ED on the Armor Remoted Target System (ARETS) progressing from PE 6.37.38.A. Initiate ED on Electronic Warfare (EW) simulators progressing from PE 6.37.38.A. Initiate ED of the Eye-Safe Laser Rangefinder (ESSLR), Squad Weapons Analytical Trainer (SWAT), Radiac Simulator.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.26.A
DoD Mission Area: #652 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	959	3209	8077	3291	Continuing	Not Applicable
	QUANTITIES (Automatic Atmospheric Sounding Sets)						5
D511	Meteorological Equipment and Systems	959	3209	8079	3293	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The goal of this program is to develop meteorological equipment and systems essential to the planning and conduct of Army combat operations. This program specifically addresses present deficiencies in the Army's ability to rapidly acquire, process, and disseminate meteorological parameters that affect deployment and operations of weapon systems. The Automatic Atmospheric Sounding Set (AN/TMQ-31 (formerly FAMAS)) is urgently required by the Field Artillery to provide ballistic meteorological support of forward area artillery. The Meteorological Station Automatic AN/TMQ-30 (formerly RAWS) is required for real-time meteorological data from remote areas in support of airborne, artillery, aviation, smoke, and chemical agent employment and/or defense. Other required systems such as portable visocelometer and a radiosondes (GPS) for improved antijam common grid use and accuracy will progress to this project in the out years.

C. BASIS FOR FY 1980 RDTE REQUEST: The Field Artillery urgently requires a highly mobile, lightweight, near real-time meteorological data acquisition system to support the forward area artillery. The current system (AN/GMD-1), a World War II vintage item, is becoming increasingly difficult and costly to maintain. Furthermore, it does not possess the required mobility, automation, and meteorological data measurement reaction time required to adequately support present and developmental artillery systems. Specifically, five engineering development models of the AN/TMQ-31 will be fabricated, computer software development will be completed, Development Test/Operational Test (DT/OT) II test plane will be prepared acceptance testing, and instructor training will be conducted for key personnel.

Program Element: #6.47.26.A
DoD Mission Area: #652 - Global Military Environmental

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	184	3209	6223	Continuing	Not Applicable

Funds were increased for FY 1978 and FY 1980 to expedite the fielding of the Automatic Atmospheric Sounding Set AN/TMQ-31 which is urgently required by the Field Artillery to provide ballistic meteorological support of forward area artillery. The current AN/GMD-1 is not capable of providing adequate ballistic meteorological support of forward area artillery. Thus, a significant threat and operational deficiency exists in the accuracy of forward area artillery fire until the AN/TMQ-31 is fielded. Also, the Republic of West Germany's Satellite program operates in the same frequency range as the AN/GMD-1 system. The US Forces must cease to operate on this frequency range in West Germany not later than 1 January 1984. This would leave US artillery with no ballistic meteorological support in West Germany after 1 January 1984, until the AN/TMQ-31 is fielded. The additional funds are required to meet the expedited schedule of fielding the AN/TMQ-31 by the first quarter of FY 1984.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	0	0	0	0	61,740	61,740
Funds (as shown in FY 1979 submission)	0	0	0	0	0	0
Quantities (current requirement)	0	0	0	0	150 systems (AN/TMQ-31)	
Quantities (as shown in FY 1979 submission)	0	0	0	0	0	0

No procurement was programed in FY 1979 since a firm procurement plan had not been developed for inclusion in the FY 1979 RDTE Congressional Descriptive Summary. The initial procurement of 20 AN/TMQ-31 systems are currently programed in FY 1982, at an estimated cost of $20M.

Program Element: #6.47.26.A
DoD Mission Area: #652 - Global Military Environmental

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Systems under development during this reporting timeframe are the Automatic Atmospheric Sounding Set (AN/TMQ-31) and the Meteorological Station Automatic (AN/TMQ-30). The AN/TMQ-31 will provide the Field Artillery with a highly mobile, lightweight, automated data processing and meteorological data acquisition system with nonradiating ground-based components, to assure maximum combat effectiveness of the Field Artillery on the modern-day battlefield. Predominantly tank oriented forces coupled with numerically superior support artillery pose the major threat. US Field Artillery will be especially vulnerable to counterbattery fires. Rapid and accurate US Field Artillery fires are a must in an effort to neutralize the threat force. The fluid battlefield situation demands quick response and a capability to deliver first-volley effective fires. Dynamic weather conditions in the threat area of operations dictates the need for timely, accurate meteorological data for the correction of US Artillery fires. Enemy electronic warfare capabilities pose a threat to obtaining timely and accurate meteorological data required for tactical operations. The AN/TMQ-30 is being developed to provide the Field Army with real-time meteorological data from remote areas. Presently, field commanders cannot obtain localized weather information from either remote friendly or enemy areas with sufficient accuracy to permit utilizing meteorology positively as a combat tool. This data can be critical for tactical operations such as Army aviation, airborne, artillery, smoke, and chemical employment or defense. Existing atmospheric sounding equipment type classified standard A in 1949 is not suitable for fulfilling artillery meteorological requirements in areas of mobility, timeliness of data, reliability, manpower utilization, and accuracy. The components were individually developed over a period of a decade, resulting in a system that does not lend itself to significant technical advances through product improvement. Manual data reduction significantly degrades the accuracy of the final product and consumes a disproportionate share of available manpower and time.

G. RELATED ACTIVITIES: 6.11.02.A, Project B53A, Atmospheric Sciences; 6.21.11.A, Atmospheric Investigations; and 6.37.41.A, Project D158, Meteorological Equipment Development. Coordination of requirements for development of meteorological equipment is effected through the US Army Training and Doctrine Command (TRADOC) and US Air Force Air Weather Service Meteorological Equipment Coordination Committee. As a result of the work of the committee, equipment is being developed to meet both Army and Air Force requirements. Coordination on meteorological equipment development with NATO allies is accomplished through participation in Panel XII (Meteorology), NATO Army Armaments Group. Several NATO nations have expressed an interest in purchasing items of US equipment currently under development. Coordination with the National Weather Service and nonmilitary organizations developing meteorological equipment for civilian use is accomplished through participation in the Interdepartment Committee for Applied Meteorological Research (ICAMR), and the Annual Symposium on Meteorological Observations and Instrumentation, sponsored by the American Meteorological Society.

H. WORK PERFORMED BY: This program is the responsibility of the US Army Atmospheric Sciences Laboratory, US Army Electronics Research and Development Command (ERADCOM), White Sands Missile Range, NM, with 50% of the work performed by the Combat Surveillance and Target Acquisition Laboratory, ERADCOM, Fort Monmouth, NJ. Contracts will be awarded to successful bidders for Engineering Development models of both the AN/TMQ-30 (FY81) and AN/TMQ-31 (FY79).

Program Element: #6.47.26.A
DoD Mission Area: #652 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defensewide Mission Support

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Meteorological Balloon, ML-537; Balloon Inflation and Launching Device, ML-595; and the Meter Volume, Hydrogen-Helium were developed, type classified, and procured for field use. The Meteorological Measuring Set, AN/TMQ-22, was developed and type classified as Standard equipment. Service testing of the Mobile Weather Radar, AN/TPS-41, was completed and a Development Acceptance In-Process Review Package was prepared. Meteorological Balloon, ML-635, was developed for low altitude soundings of the atmosphere. FY 1978 funds were utilized to purchase Government Furnished Equipment (GFE) which will be provided to the successful bidder of the contract for inclusion in the Engineering Development models of the AN/TMQ-31. The above accomplishments provide more advanced/state-of-the-art meteorological support equipment for the Army on

2. FY 1979 Program: The program to field the AN/TMQ-31 will be continued with the award of a contract for Engineering Development models. Contract will be monitored and development test plans will be prepared and coordinated. Continuous coordination will be maintained with the user to insure active participation at all decision processes which could impact on doctrinal and training requirements.

3. FY 1980 Planned Program: The contract for Engineering Development models of the AN/TMQ-31 will be continued with the fabrication of models completed. Acceptance testing will be initiated at the contractor's plant and at various government facilities. Training will be initiated for development test personnel. All necessary experimental work has been performed and the AN/TMQ-31 is ready for full-scale development.

4. FY 1981 Planned Program: Acceptance testing of the AN/TMQ-31 will be completed. Training of field test personnel will be completed and development testing conducted. Procurement data package will be prepared and negotiations will be conducted for initial production of the AN/TMQ-31. Engineering Development will be initiated on the AN/TMQ-30 with the preparation of a procurement data package for Engineering Development models. The contract will be negotiated and awarded to the successful bidder.

5. Program to Completion: This is a continuing program. The fielding of the AN/TMQ-31 will be completed with Initial Operational Capability in FY 1984 and the AN/TMQ-30 in FY 1985. Other Meteorological Systems required to support the Field Army will be accomplished under this project, such as the slant range visiometer to sense visibility for pilots; also used to measure cloud heights for tactical airfields; and to provide real-time meteorological data from satellites which will include short-term predictions of adverse weather, wind, and moisture.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2500	2000	2300	3020	Continuing	Not Applicable
M980	TRADOC Studies & Analyses	2500	2000	2300	2620	Continuing	Not Applicable
M992	Combined Arms Training Center	0	0	0	400	0	400

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the conduct of contract studies and analyses for the US Army Training and Doctrine Command (TRADOC) to investigate specifically defined problems that require the application of sophisticated analytical techniques and which, when solved, will make substantive contributions to TRADOC planning, programing, and decisionmaking. Department of the Army guidance leads to prioritization of these problems. This program funds studies and analyses that address high priority problems which require capabilities not available in-house.

C. BASIS FOR FY 1980 RDTE REQUEST: Individual contract efforts will focus on Cost and Operational Effectiveness Analyses, Cost and Training Effectiveness Analyses, assessment of doctrine, and continuation of ongoing studies and analyses. These efforts will provide both new and updated analyses and assessments to enable decisionmakers to make sound and rational decisions regarding matters such as resources allocation, doctrine, and training.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	2500	2600	3900	Continuing	Not Applicable

The difference in funding for FY 1979 is a result of a Congressional reduction. Review of proposed problem areas for study in FY 1980 resulted in identification of requirements more appropriately funded under OMA. Therefore, $1600 in funds for FY 1980 has been included in that appropriation (FY 1979 Congressional Descriptive Summary included all funds in RDTE).

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide for the conduct of contract studies and analyses for the US Army Training and Doctrine Command (TRADOC). Sophisticated analytical techniques are used to integrate and analyze a variety of factors; results lead to conclusions and recommendations which make substantive contributions to Army and TRADOC planning, programing, and decisionmaking. Study contributions include assistance in improving the understanding of: alternative organizations, tactics, doctrine, policies, and procedures; cost effectiveness of existing and proposed systems or programs; and allocation of resources. The studies organize and evaluate data and information already available or which can be inferred or extrapolated from existing data.

G. RELATED ACTIVITIES: The program is coordinated by the Office of the Chief of Staff of the Army. Interservice efforts are coordinated by the Office of the Under Secretary of Defense for Research and Engineering. Prior to initiating a new study, the Defense Documentation Center is queried to determine if existing studies might answer or provide insight to the question under consideration. Completed studies are filed with the Defense Documentation Center.

H. WORK PERFORMED BY: All RDTE funded work is done under contract. Primary contractors are: Mellonics System Development Division, Sunnyvale, CA; TRW Defense and Space Systems Group, West Huntsville, AL; Decisions and Design, Inc., McLean, VA; Science Applications, Inc; McLean, VA; Braddock, Dunn and McDonald Services Co., McLean, VA; Martin Marietta Aerospace, Orlando, FL; Systems Development Corp, Huntsville, AL. The TRADOC integrating centers (i.e., Combined Arms Combat Developments Activity, Personnel and Administration Center, and Logistics Center) assist Headquarters, TRADOC in formulating the TRADOC study and analysis program. The TRADOC Service Schools and Integrating Centers monitor the execution of the program by the contractors.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 78 and Prior Accomplishments: An evaluation of Air Defense Force requirements for US Army Divisions in the 1980-1990 time frame resulted in an improved manual system for tactical command and control. A reoriented Tactical Operations System study provided a software tool for follow-on definition of the engineering prototype software requirements (division level). A study defined aviation requirements for the combat structure of the Army in the 1977-1986 time period, evaluated effectiveness of current and future aircraft organizations and provided an analytical base for future decisions regarding aircraft requirements. An analysis provided data required to make forecasts of training ammunition requirements, justify forecasts and explore alternatives to the use of blank ammunition. The Retail Stockage Policy (Bulk Supplies) study provided a comparative analysis of alternative bulk petroleum retail distribution system. Methodology was developed for correlating combat effectiveness with logistics support. A cost and training effectiveness analysis for the ground/vehicular laser locater designator resulted in the design of a cost effective training program for the system.

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: The Tactical Operations System (TOS) at Corps and Subordinate Echelons (CASE) Requirements Definition study will complete definition of TOS CASE requirements. The Technical Interface Concept on the Corps Battlefield study will describe sources and recipients of information on the corps battlefield, i.e., information requirements by echelon and format information needs. An XM1 tank Cost and Training Effectiveness Analysis (CTEA) will be performed to determine the cost effective training program for the tank. A CTEA will also be performed for the Battlefield Surveillance Target Acquisition Radar. A Division Electronic Warfare Intelligence Functional analysis will be performed to establish the automation baseline of related management and analysis functions. Analysis of the Integrated Tactical Communication System will be continued to update the definition of communication support requirements based upon planned organizations and new systems to be fielded. Upgraded simulation and wargaming models will be developed to allow for improved cost effectiveness analysis of proposed new weapons, logistics, intelligence, and electronic warfare systems. Techniques to Counter Air Defense Suppression will be studied to develop air defense doctrine, tactics, and techniques necessary to counter enemy attempts to suppress air defense sites. Studies will be conducted to determine the optimal organization, tactics, and doctrine to be employed by Army divisions in the 1986 time frame.

3. FY 1980 Planned Program: Cost and Training Effectiveness Analyses will identify methods and resources for training in field artillery systems, machine gun marksmanship and rifle employment. Updated Cost and Operational Effectiveness Analyses (COEA's) of the new Division Air Defense Gun and the PATRIOT system will be performed to assess the impact of changes in cost, threat, and potential performance characteristics of these systems in comparison with alternatives. Firing doctrine for the PATRIOT system will be studied to determine the doctrine for optimizing weapon performance. Support for the Division 1986 study will be continued. Software Requirements for Developmental Air Defense Systems will be analyzed to determine system effectiveness and document software requirements. The FY 79 initiated effort to study Techniques to Counter Air Defense Suppression will be continued. A methodology will be developed for evaluating electro-optical countermeasures for use in surveillance, target acquisition, and missiles. Battlefield Automated System Operational Design Criteria will define interoperability, continuity of operations, security, and reliability, availability, and maintainability for battlefield automated systems. A concept for the integration of a jammer locate capability into electronic warfare doctrine and equipment will be developed.

4. FY 1981 Planned Program: The FY 1981 program will be oriented toward performing analyses which will assist in solving priority problem areas for the Army. These will include analyses of organizations, doctrine, tactics, weapon systems, logistic support, personnel support, and training aspects. Weapon system cost and training effectiveness analyses will be performed for selected developmental systems. Evaluation will be made of combined arms force-on-force tactical engagements to validate Army program requirements. As part of the implementation of the AC^2 Master Plan, communication requirements for the Corps will be studied in order to provide a path for future communications systems. (The AC^2 Master Plan is being developed by HQDA and should be completed in FY 1980.)

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.52.01.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Aviation Engineering Flight Activity
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3303	3785	4000	4100	Continuing	Not Applicable
D066	Aviation Engineering Flight Activity	3303	3785	4000	4100	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides the mission funds for the US Army Aviation Engineering Flight Activity (AEFA), located at Edwards Air Force Base, CA. Funds are included for civilian employee wages and benefits, temporary duty per diem and travel, rents and utilities, contractual services including computer maintenance and housekeeping functions, supplies and materials, and replacement of capital equipment. AEFA provides the only capability within the US Army to conduct the engineering flight tests required for: preliminary aircraft evaluation, support of development and procurement of new aircraft systems, and modifications to existing aircraft.

C. BASIS FOR FY 1980 RDTE REQUEST: FY 1980 funds are required to provide the continuing capability to support the planned development and product improvement program for Army aviation.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	3001	3785	5362	Continuing	Not Applicable

The FY 1978 increased funding provided for replacement of capital equipment and additional supplies and materials in support of the flying program. The estimate for FY 1980 in the FY 1979 request included funds for a replacement flight test data processing system which was subsequently disapproved.

E. OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

Program Element: #6.52.01.A Title: Aviation Engineering Flight Activity
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of the Activity which this program supports is to conduct engineering flight testing of Army aircraft being developed or procured to include Development Test I and II, to evaluate air vehicles incorporating advanced concepts with potential military application, and to determine airworthiness of proposed engineering change proposals or modifications to existing aircraft systems. Engineering flight testing consists of precision flight to collect airborne data to be used for engineering evaluation of the aircraft's performance, structural integrity, or handling qualities. The data are normally collected using a specially designed and installed data acquisition package. Data from the flight testing are used as a basis for the US Army Aviation Research and Development Command (AVRADCOM) Statement of Airworthiness Qualification which assures compliance with pertinent design standards. Thirty to forty flight test projects are normally accomplished in each fiscal year. This program also provides for the conduct of an orientation course for Army aviators which reviews academic fundamentals and exposes students to flight test techniques in preparation for attendance at the US Naval Test Pilot School.

G. RELATED ACTIVITIES: This Activity provides occasional flight test support on a reimbursable basis to agencies such as the United States Forest Service and the National Aeronautics and Space Administration (NASA) on joint NASA-Army projects, such as development of the XV-15 tilt rotor research aircraft.

H. WORKED PERFORMED BY: United States Army Aviation Engineering Flight Activity, Edwards Air Force Base, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: During FY 1976 and FY 1977, the US Army Aviation Engineering Flight Activity (AEFA) major test programs included the Utility Tactical Transport Aircraft System (UTTAS) Government Competitive Test and the Advanced Attack Helicopter (AAH) Development Test I. During FY 1978, AEFA completed twenty-seven test programs including the following: Advanced Attack Helicopter (AH-64) Engineering Development Test (EDT) I, UH-1H Stand-off Target Acquisition System (SOTAS) Preliminary Airworthiness Evaluation (PAE), Enhanced Cobra Armament System (ECAS) PAE, Kaman AH-1S Rotor Blade Airworthiness and Flight Characteristics (A&FC), OV-1D HOT BRICK, Infrared Countermeasure, PAE, and OH-58C PAE. At the close of FY 1978 there were thirty-eight assigned projects in either the planning, instrumentation, flying or reporting stages.

2. FY 1979 Program: Major helicopter test programs for FY 1979 include UH-60A (BLACK HAWK) Production Validation Testing, Artificial Icing Testing of the UH-60A, the UH-1H, and the CH-47C with fiberglass rotor blades, airworthiness testing of the AH-64 Pilot Night Vision System (PNVS) on AH-1S surrogate trainers, AH-64 EDT II, U-21 minimum control airspeed testing, and UH-60A A&FC testing.

3. FY 1980 Planned Program: Major helicopter test programs for FY 1980 include AH-64 Engineering Development Test (EDT) III and IV, AH-64 Target Acquisition Designation System and Pilot Night Vision System fly-off, EH-60B Standoff Target Acquisition System (SOTAS) Preliminary Airworthiness Evaluation (PAE), and CH-47D PAE, Icing, and Climatic Hangar tests.

4. FY 1981 Planned Program: FY 1981 major test programs are expected to include AH-64 EDT V, Airworthiness and Flight Characteristics (A&FC), and Icing and other programs as required to support new development and product improvement programs.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.53.01.A
DoD Mission Area: #621-Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6-Defense wide Mission Support

A. RESOURCES (PROJECT LISTING: ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	82239	87620	93667	99300	Continuing	Not Applicable
D614	KWAJALEIN MISSILE RANGE	82239	87620	93667	99300	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Kwajalein Missile Range (KMR) is a national missile range managed and operated by the Army for the purpose of strategic offensive missile, ballistic missile defense and space defense testing. KMR utilizes eleven islands in the Kwajalein Atoll located approximately 2100 nautical miles southwest of Honolulu. The principal range users are the Air Force and Navy Intercontinental Ballistic Missile/Sea Launched Ballistic Missile Programs and the Army Ballistic Missile Defense Systems and Advanced Technology Center programs. Testfiring to tactical ranges in tactical configuration with complete engineering data collected during the terminal portion of the trajectory is essential to the development and later operational testing of all ICBM/SLBM programs. Because of its location and sophisticated data collection facilities, KMR is the only range where this testing can be done. Additionally, the Army Ballistic Missile Defense programs require data collection from full scale, tactically configured ICBM/SLBM targets by their own sensors as part of their experiments. Again, KMR is the only range where these experiments can be done. An added advantage is that these targets are used by the Army programs at no added cost to the government for targets. KMR will participate in the Air Force Pacific Radar Barrier (PACBAR) program to provide early track of in addition to its established role of from orbiting satellites. Location and sophisticated radar data capability makes this role possible.

C. BASIS FOR FY 1980 REQUEST: The FY 1980 funds are required for the continued operation of Kwajalein Missile Range in support of all services. During FY 80, the Army, Air Force, and NASA have substantial programs planned with significant test and measurement data required to be gathered at KMR. Air Force programs require firing at ICBM range with complete data collection during terminal trajectory. Army programs require project sensors to collect data from the and NASA requires support by technical facilities available on KMR in the geographic location of KMR. These test data cannot be obtained by testing anywhere in the world except at KMR.

Program Element: #6.53.01.A
DoD Mission Area: #621-Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6-Defense Wide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	82239	87620	93800	Continuing	Not Applicable

The $133K decrease in FY 80 funding request is due to the transfer of base communications support responsibility to the U.S. Army Commercial Communications Office. Funding for communications support is being requested by that office

E. OTHER APPROPRIATION FUNDS:

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Military Construction, Army:						
Funds (current requirements)	$2603	$6571*	$8110***	$5259*****	$ 0	$ N/A******
Funds (as shown in FY 1979	$2603	$16147**	$2152****	-	$ 0	$ N/A******

*Funds actually approved by Congress for the Sewage Treatment Plant only.
**This figure includes the Sewage Treatment Plant, Barracks Modernization, Resizing and Modernizing of Range Facilities and the Marine Shop - Only the $6.571M for the Sewage Plant was approved.
***This figure includes projects deferred from the FY 79 program with some reductions in scope and cost.
****This figure includes the Marine Shop and the Gymnasium. The gymnasium has been deferred to 1981 since the FY 1979 submission.
*****This figure includes the following: the Gymnasium - $1250; the Live Explosive Facility - $ 339; and the Army Optical Station Addition - $3670.
******Each MCA project is totally funded in the year for which the MCA appropriation bill is enacted.

Program Element: #6.53.01.A
DoD Mission Area: #621-Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity #6-Defense wide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Kwajalein Missile Range is a national range managed and operated by the Army primarily for strategic offensive missile and ballistic missile defense research and development testing and for'

KMR is managed by a small military and civilian staff with the majority of members in Huntsville, Alabama; the rest being resident on Kwajalein in the Marshall Islands. Operation of the KMR both technically and logistically is through the use of five major and two minor contractors. Eleven islands of the Kwajalein Atoll are used for KMR operations including all logistics, data collecting instrumentation, and other technical facilities.

Principal range user programs with concentrations of equipment and personnel on KMR are the Ballistic Missile Defense Systems Technology Program and the BMD Advanced Technology Center. Data essential to the success of both is dependent on the availability of full scale Intercontinental Ballistic Missiles/Sea Launched Ballistic Missiles targeted to impact in the general vicinity of data collecting sensors. These data collecting sensors include both those of the range user programs and the sophisticated sensors of KMR. KMR is the sole range in the free world offering this capability. Other major range users are the Air Force ICBM and Navy SLBM programs. Air Force programs include all Space and Missile System Organization Advanced Ballistic Reentry Systems research and development programs and the SAC MINUTEMAN Operational and Training Test firings. Plans are being made to support the MINUTEMAN MX program in the future.

The Navy SLBM programs have included development firings for both the POSIEDON and TRIDENT programs in the past and plans are being made to similarly support testing of the TRIDENT II. KMR is the only free world range where the ICBM/SLBM can be fired to full range in tactical configuration with sophisticated technical data collection capability. The BMD programs require data collected by their own sensors from tactically configured ICBM/SLBM during the terminal portion of the trajectory. Locating these BMD experiments on KMR allows data collection from ICBM/SLBM test missiles already scheduled as part of strategic offensive program testing without added cost to the government. In addition to the support of development programs, KMR also provides

G. RELATED ACTIVITIES: There are no related activities. No other DOD facility duplicates capabilities available at KMR.

H. WORK PERFORMED BY: The KMR is managed by the Ballistic Missile Systems Defense Command, Huntsville, Alabama. Contractors are: Global Associates, Oakland, CA; Kentron International, Dallas, TX; Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; Radio Corporation of America, Moorestown, NJ; GTE Sylvania, Needham Heights, MA; and two other contractors at a total cost of $2,340,000.

Program Element: #6.53.01.A
DoD Mission Area: #621-Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6-Defense wide Mission Support

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Kwajalein Missile Range was established as a National Range on 1 July 1964 under the management of the Army. The Advanced Research Projects Agency installed the TRADEX radar system during 1963 and both the ALCOR and the ALTAIR radar systems during 1970. The Army has maintained these sophisticated "one of a kind in the world" radar systems at "state-of-the-art" with an active improvement program through the years. These radars and associated data processing equipment have been used successfully in obtaining detailed data on the signatures produced on atmospheric reentry by ballistic missile warheads and accompanying equipment and debris. This data is essential to the development of techniques to discriminate between the actual warhead, decoys and other penetration aids, and debris. These radars were also used to test waveforms and radar techniques that were eventually incorporated into the SAFEGUARD BMD System. Both the NIKE-ZEUS BMD and SAFEGUARD BMD programs with full system interceptor firings were completed at KMR. Three additional instrumentation radar systems, 2-MPS-36 and 1-TPQ-18 have been installed to improve trajectory measurement and other data collection. Sophisticated recording optical trackers (RADOTS), as well as other optical instruments needed, are installed on several islands in the atoll to satisfy automatic data reduction, and permit replacement of ten instruments with six with cost savings potential. Budget constraints during prior years coupled with a severe budget cut for FY 1978 delayed completion of this program and deferral of both modernization and physical plant maintenance projects. Telemetry and impact locating radars are installed on appropriate islands to serve user needs. The operations control center is on Kwajalein Island and is supported by a communication center and an inter-range communication network including a satellite communication terminal. A central data processing facility for support of the technical mission is also on Kwajalein Island. Missile launch pads are on both Kwajalein and Roi Namur Islands to satisfy users' needs. During this period, KMR supported all Air Force Advanced Ballistic Reentry System experimental and developmental firing programs, all SAC MINUTEMAN Operation and Training and Special Test Missile Firings and U.S. Navy SLBM programs.

2. FY 1979 Program: During FY 1979, KMR will have 34 missile firings involving ICBM's and over 200 other test operations. Air Force activity is expected to increase slightly over FY 78. Additionally, both the BMD System Technology Program and the Advanced Technology Center Designating Optical Tracker program have scheduled firing tests this year. The current budget level will allow a limited amount of range technical improvement needed to more nearly meet users currently stated data requirements.

3. FY 1980 Planned Program: Test activity is expected to be approximately the same level as during FY 1979 with the Army and Air Force programs the major users, but with NASA and other minor users continuing to be supported. Careful management and restrained cost growth in all areas will allow a reasonable level of technical modernization. Most of these modernization projects have been deferred from prior years. The TPQ-18 instrumentation radar will be modified to current level of technology to improve overall system accuracy, increase operating reliability and reduce future maintenance costs; the completion of the RADOT conversion is planned to meet user measurement accuracy needs, allow non-manual data reduction, and provide future cost savings. The program of replacing obsolete, inadequate meterological sounding systems will be completed. No range funded new starts are planned.

Program Element: #6.53.01.A
DoD Mission Area: #621-Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6-Defense wide Mission Support

4. FY 1981 Planned Program: The FY 81 program is forecast to remain at about the same level of test activity as FY 79 and FY 80. Army activity is forecast to remain constant while the Air Force activity will drop slightly; however, this drop is offset by an increase in NASA support.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.02.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Support of Development Testing
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	17371	20453	23790	23181	Continuing	Not Applicable
D026	Test Design and Evaluation	2609	2798	3032	3270	Continuing	Not Applicable
D127	Meteorological Support to RDTE Activities	3800	4490	4100	5583	Continuing	Not Applicable
D204	Field Smoke Assessment	448	435	4600	1580	Continuing	Not Applicable
D575	US Army Materiel Development and Readiness Command (DARCOM) Support of US Army Training and Doctrine Command (TRADOC) Combined Arms Test Activity	1	0	0	0	0	1280
D618	Aircraft Development Test Activity	5728	5971	6285	6283	Continuing	Not Applicable
D621	US Army Test Facilities Register	0	0	173	180	Continuing	Not Applicable
D623	US Army Test and Evaluation Command (TECOM) Instrumentation Development	2585	4239	3500	4094	Continuing	Not Applicable
D625	TECOM Test Methodology	1526	2520	2100	2192	Continuing	Not Applicable
D671	Surface-to-Air Missile Tactical Vulnerability	674	0	0	0	0	6906

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides funding to subordinate activities of the US Army Materiel Development and Readiness Command (DARCOM) for indirect support of development test and evaluation other than test and evaluation conducted at DARCOM facilities included in the Major Range and Test Facility Base. Indirect test support at such DARCOM facilities is funded by Program Element (PE) 6.58.04.A, DARCOM Ranges/Test Facilities. The indirect support funded by this program consists of salaries, supplies, travel expenses, equipment, host/tenant costs, and services not directly associated with any particular test project. Development test and evaluation supports materiel acquisition program decisionmaking, specifically with regard to design risks, completeness of engineering development, and ability of the system to meet its specifications.

Program Element: #6.57.02.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Support of Development Testing
Budget Activity: #6 - Defensewide Mission Support

C. BASIS FOR FY 1980 RDTE REQUEST: Provides for continuation of projects to support Army development test and evaluation. A significant increase in funding compared to FY 1979 is provided for project D204, Field Smoke Assessment, to accommodate increased emphasis on testing of electro-optical systems in an obscured battlefield environment with the objective of improving their effectiveness in such an environment.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	16452	20453	21624	Continuing	Not Applicable

FY 1978 funding was increased compared to last year's FY 1978 estimate to provide for actual costs of operating Aircraft Development Test Activity (ADTA) and to begin integration of field smoke assessment efforts under a single project in FY 1978. The current FY 1980 estimate is greater than last year's FY 1980 estimate as a result of increased testing of electro-optical systems in an obscured battlefield environment.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.02.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Support of Development Testing
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Seven projects are funded under this program for FY 1980. The first project provides funds to the US Army Materiel Systems Analysis Activity (AMSAA) for independent design of development tests and for subsequent independent analyses and evaluations of the results of these tests. These evaluations contribute to decisions with respect to all major US Army Materiel Development and Readiness Command (DARCOM) materiel acquisitions and selected nonmajor acquisitions. AMSAA has been allocated 63 civilian spaces for this purpose. Each test design is fully coordinated with the primary agencies involved in that materiel acquisition including US Army Test and Evaluation Command (TECOM), US Army Operational Test and Evaluation Agency (OTEA), the Project Manager and contractor. Consideration is given to test sample size, duration, costs and risks and how they interrelate to the decisionmaking process. AMSAA test design and evaluation efforts now encompass about 60 systems of which about 2/3 are nonmajor systems (e.g., Family of Military Engineer Construction Equipment, VULCAN Air Defense Gun and Ground Laser Locator Designator). The second project (D127) provides for meteorological support services at White Sands Missile Range, 12 other permanent test sites, and various temporary sites. Data is provided on conditions near the earth's surface up to the high altitudes of missile flights and space vehicles, including measurements of solar radiation, refractive index, air density, soil moisture, air temperature and humidity, and wind. Complete weather services and the highly specialized meteorological data collection are provided before, during and after tests to range users, including Defense Nuclear Agency and National Aeronautics and Space Administration, and professional consultations regarding the data collected are also provided. Army participation in the Meteorological Rocket Network is provided by the operation of three rocket launching sites at White Sands Missile Range, NM; Poker Flat, AK; and Fort Sherman, CZ. This network provides upper air measurements between 30 and 100 kilometers. The third project (D204) provides for the development of methodology and instrumentation to determine the vulnerability of electro-optical (EO) items to smoke/obscurant countermeasures with emphasis on laser-guided artillery projectiles, laser designators, infrared sensors, and other fire control and guidance devices. This requires measurements of smoke cloud characteristics, attenuation of electro-optical energy and meteorological and lighting conditions. The Aircraft Development Test Activity (ADTA), Ft. Rucker, AL, conducts development tests of aircraft and components and gathers data to aid in determining component service life, repair parts consumption and required inspection cycles. 3/5 of ADTA funding is for an aircraft maintenance contract. The rest is primarily for salaries of civilian test personnel, host support, instrumentation and supplies. The fifth project (D621) provides for control of new or modified test facilities/equipment. The principal output is the publication and distribution of the US Army Test Facilities Register to include gathering the necessary data and keeping it current. The US Army Test Facilities Register contains descriptions and locations of Army test facilities, instrumentation, and test equipment. The sixth project (D623) provides for development of instrumentation that is unique to the testing of complex weapon systems at more than one TECOM test activity, that is commensurate with technological advances in materiel developments and that applies modern technology to cost- and labor-intensive areas so as to enable more efficient testing at lower manning levels. The seventh project (D625) provides for the development and improvement of test methodology for all TECOM test activities, to include improving test procedures and/or developing new test techniques to enable effective testing of the advanced technology systems to be developed and to reduce test manpower, costs and duration. Methodology efforts are extremely important as a prerequisite in determining what instrumentation needs to be developed.

G. RELATED ACTIVITIES: This program with its emphasis on testing is closely related to: the varied Army materiel developing activities; development testing activities of the ranges and test facilities funded by Program Element (PE) 6.58.04.A, US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities; activities of the US Army Operational Test and Evaluation Agency (OTEA) funded by PE 6.57.12.A, OTEA Operational Testing; testing activities of the US Army Training and Doctrine Command (TRADOC) funded by PE 6.57.07.A, TRADOC Operational Testing; and similar test activities conducted by the other Services. Instrumentation and test methodology are developed under PE 6.57.02.A for the ranges and test facilities funded by PE 6.58.04.A. The Army Staff directs close and continuous coordination between TRADOC agencies responsible for test and use of materiel items, development test activities, materiel developing agencies and OTEA to insure greatest possible effectiveness of Army testing activities and to avoid duplication of instrumentation development efforts. This PE, 6.57.02.A, is now structured to support only development testing. Project DV02, Test Boards, was moved under PE 6.57.07.A in FY 1977 since the test boards now primarily support operational testing and the boards have been transferred to TRADOC. DARCOM support of TRADOC Combined Arms Test Activity, project D575, formerly under this PE, is reduced to a 2-man effort for FY 1979 and funded under Programwide Activities, PE 6.58.01.A. Surface-to-Air Missile Tactical Vulnerability, project D671, is also eliminated from this PE in FY 1979 and the effort incorporated into project D235, Missile Counter-Countermeasure Technology, under PE 6.37.13.A, Electronic Warfare Vulnerability/Susceptibility. Project M857, Explosives Safety Standards, and project D620, DoD Munitions Effectiveness, were moved to a new PE, 6.58.05.A, DoD Munitions Effectiveness and Explosives Safety Standards, for FY 1979, since these two projects are not primarily concerned with support of development testing. Project D066, Aviation Engineering Flight Activity, was moved to a new PE, 6.52.01.A, Aviation Engineering Flight Activity, for FY 1979, because its primary emphasis is in support of engineering. During FY 1977 and prior years, techniques for the characterization of smoke in field environments and associated instrumentation were developed under project DE82, Flame, Smoke and Incendiary Materials, PE 6.36.27.A, Combat Support Munitions. This capability was demonstrated during tests at White Sands Missile Range in July 1977. Control of new test facilities/equipment and publication of the US Army Test Facilities Register is funded by project D623, US Army Test and Evaluation Command (TECOM) Instrumentation Development, in FY 1979. The Office of the Secretary of Defense carefully reviews the management, operation and maintenance of all Department of Defense test facilities and planned testing programs to avoid unnecessary duplication of capabilities, to insure that the highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services.

H. WORK PERFORMED BY: Approximately 80 percent of the effort is performed in-house by civilian and military personnel assigned to DARCOM. There is an aircraft maintenance contract with Northrop Worldwide Aviation Services ($3.8 million) at the Aircraft Development Test Activity, Ft. Rucker, AL, and numerous other smaller contracts.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: In FY 1976, when the Army's test boards were transferred from TECOM to TRADOC, a new project, D026, Test Design and Evaluation, was established to provide for design of development tests which contribute to decisions with respect to acquisition of major and selected nonmajor materiel systems and for evaluation of test results; both

test design and evaluation (TDE) to be conducted independently of the project manager. TDE was applied to all major materiel systems such as ROLAND and PERSHING II missile systems in FY 1977. Significant reductions were made in test sample sizes and durations while retaining acceptable decision risks, resulting in savings estimated at 30 million dollars. Meteorological support was provided to an average of 600 RDTE projects each year at 13 permanent test sites and at an average of 10 special sites. In FY 1978, 650 meteorological rockets were fired at three sites in the Meteorological Rocket Network. An intensive effort to improve meteorological observation techniques was begun to include survey team visits to the Meteorological Teams (that perform meteorological support services) and their major customers to determine effectiveness of present procedures and instrumentation required to provide efficient and effective services. In FY 1978, the Smoke Week concept, whereby many (approximately 20) electro-optic (EO) devices are simultaneously exposed to realistic smoke/battlefield obscurants, was initiated. Instrumented field trials were held at White Sands Missile Range, NM, and Dugway Proving Ground, UT, to simultaneously subject EO devices to countermeasure effects of smoke/dust/battlefield debris. Results from data analysis yielded information relating to effectiveness of EO devices in smoke/obscurants environment. Smoke Symposiums were held to facilitate exchange and dissemination of information relative to overall smoke/obscurant and EO efforts. The Aircraft Development Test Activity (ADTA) conducted development tests and competitive evaluations of aircraft systems and components such as BLACKHAWK utility tactical transport aircraft system and Quad Laser Warning Receiver. The level of testing effort at ADTA increased substantially in FY 1978 compared to prior years. ADTA began to execute a policy of charging users for direct test costs in FY 1978. Development and improvement of test instrumentation (project D623) included: a one-of-a-kind scoring radar for air defense weapon testing; an advanced, high precision laser tracker; a projectile airburst and impact locating system for artillery testing; a large electromagnetic interference test chamber capable of testing complete vehicles; moving target systems for evaluation of infantry weapons; in-flight monitoring equipment; improved automated data handling systems; specialized infrared test equipment; sensor test instrumentation; range instrumentation command and control; aircraft armament test instrumentation; and vehicle test instrumentation. Major efforts in FY 1978 included advanced data processing technology, new generation doppler velocimeters, artillery and mortar hit scoring, projectile dynamic measurement system, laser ranging/video theodolites, graphic display interface, improvements to position location systems, antenna test instrumentation, and gun fire control data systems. Existing test procedures were documented and the test methodology program placed emphasis on techniques for data collection and reduction, including use of automatic data processing, simulation and math modeling to decrease test cost and improve reproducibility of test results. Methodology efforts provided substantial benefits for small investments. A considerable head start was achieved by the Army in determining test techniques and instrumentation requirements for high energy laser systems and in developing analytical techniques associated with testing, simulation and monitoring of software elements of computer-supported combat systems. The latter techniques were used for planning test and evaluation of the PATRIOT air defense missile system. Other significant advances were made in test techniques in the areas of electro-optics, smoke and camouflage, electromagnetics, shock and vibration, automotive cooling, avionics, infrared seekers, and analysis of electronic images; and a laser reflectance model was developed. Independent evaluations were made of the vulnerability of surface-to-air missiles to electronic warfare. FY 1978 efforts include preparation of a military standard procedure for fungus testing, development of test procedures for laser seekers (terminal homing munitions) and laser designators, completion of methodology for testing software-driven systems and initiation of a new effort in simulation of a two-color seeker for guided missile systems.

2. FY 1979 Program: Independent test design and evaluation effort will include: Advanced Attack Helicopter, PATRIOT, Tactical Operations System, XM1 tank, COPPERHEAD, HELLFIRE, Infantry Fighting Vehicle and General Support Rocket System. Meteorological support services are being provided to important DoD projects to include demilitarization and detoxification; Electro-Optic program at Grafenwoehr, West Germany, and Fort A. P. Hill, VA; Smoke/Aerosol program at Dugway Proving Ground, UT; Ground Laser Locator Designator; ROLAND; and STINGER. Modernization of instrumentation and data acquisition systems includes improvement of automatic wind-measuring radars and real-time systems; automation of seven Meteorological Team Central Observatories and acquisition of prototype instrumentation for remote meteorological sites. A second Smoke Week was conducted at Eglin Air Force Base, FL, in November 1978, to allow developers of a large number of electro-optic (EO) devices to evaluate their hardware in a realistic smoke/battlefield debris environment; data is being analyzed to yield correlation between characteristics of smoke/obscurants and performance of EO devices and to improve mathematical models for predicting effects of smoke/obscurant environments upon EO devices. Smoke Week III will also be conducted in FY 1979 at a site having different terrain and meteorological conditions. Subsequent Smoke Weeks will be conducted approximately annually. The level of testing effort at Aircraft Development Test Activity (ADTA) will increase again in FY 1979 and includes tests of advanced attack helicopter and CH-47 Modifications. A major effort will be made in project D623 to complete developments started in prior years of a number of high priority test instruments, to include a real-time video theodolite that will eliminate much of the most labor intensive element of obtaining cinetheodolite data, thus saving over $14,000 per hour of data collection; and a projectile dynamic measurement system to accurately measure the nutation, precession, yaw and spin of an artillery projectile in flight, thus providing potential savings of millions of dollars by avoiding discovery of stability problems after completion of projectile development. Other efforts include a significant improvement to the Miss-Distance Radar and a system to precisely measure the angle between gun pointing and target location, both required for testing Division Air Defense Gun. Test methodology efforts include improvement of procedures for testing lasers under extreme climates and developing the capability to test electromagnetic systems in complex environments created by deliberate enemy countermeasures as well as by friendly electromagnetic generating systems.

3. FY 1980 Planned Program: Independent test design and evaluation will be expanded to address several additional systems and will aim to improve the materiel acquisition process by providing appropriate evaluations regarding the adequacy of materiel systems at significant milestone points during the development cycle. US Army Materiel System Analysis Activity (AMSAA) will utilize such techniques as modeling, simulation, statistical design of experiments, system analysis, engineering and operations analysis, and appropriate data bases in lieu of, or to supplement the various and sundry tests. Assessments will be made of all factors pertinent to the decision process, to include contractor results, Development Test (DT) and Operational Test (OT) results, producibility, life cycle costs, and logistics factors. Specific materiel items will include STINGER, Single Channel Ground and Airborne Radio System, Lightweight Company Mortar System and Remotely Piloted Vehicles. Meteorological support services will be provided to high priority programs, to include EO, Smoke/Aerosol, Advanced Attack Helicopter (AAH), High Energy Laser (HEL), Advanced Heavy Antitank Missile System (AHAMS), High Energy Laser Air Defense System, NAVSTAR Global Positioning System, and General Support Rocket System Terminal Guided Warhead. Meteorological rocket and balloonsonde data impact prediction ballistic support will continue at White Sands Missile Range (WSMR). The systematic Army Meteorological Rocket Network (MRN) sounding schedule (three per week) will be continued. In addition, special event sounding will be

made to support programs such as the Satellite/Rocketsondes Comparison Program, Defense Nuclear Agency programs, and the US/USSR meridional network data exchange agreement. Configuration of automated upper air sounding systems for installation at Meteorological Teams (permanent sites) will be determined. The annual Smoke Week will be conducted to provide smoke/battlefield debris environment and results of Smoke Week tests will be provided to developers of smoke and Electro-Optic (EO) hardware for use on their programs. Improved instrumentation and methodology will be developed, or otherwise acquired, for characterization of smoke/dust/battlefield debris. Major tests of Advanced Attack Helicopter (AAH), HELLFIRE Fire-and-Forget Missile System and Target Acquisition Designation System (TADS) will be conducted under obscured (battlefield) conditions. Aircraft Development Test Activity (ADTA) will conduct development tests of aircraft systems and components such as UH-1H Main Rotor Assembly and Missile Detector System. Project D621 will provide for the salaries of personnel in the US Army Materiel Development and Readiness Command (DARCOM) Test Facilities Management Office to carry out the control of new or modified test facilities/equipment and to avoid unnecessary duplication. Project D623 efforts will include: development of a target simulation facility to reduce the need for live tests of such systems as XM1 Tank and Division Air Defense Gun System, and development of on board instrumentation for missiles and vehicles; a multi-target modification to instrumentation radars; and a cooperative project with the US Army Training and Doctrine Command (TRADOC) for an indirect fire artillery and mortar scoring system. Test methodology efforts will be conducted in high priority areas such as communications in a countermeasure environment, determining environmental pollution effects of testing, assessment of human factors, nuclear effects, environmental quality control, software and simulation (e.g., for testing computer-controlled systems).

4. FY 1981 Planned Program: Test design and evaluation will be expanded to address 70 systems. Meteorological support will be provided to programs such as: Smart Direct Fire Antitank Projectile, Remotely Piloted Vehicles (RPV), and Tactical Satellite Communication System. A four year program will be initiated to modernize meteorological support equipment with emphasis on automation. Upper air sounding systems will be automated by FY 1982, while modernization of remaining equipment for the meteorological teams will be completed by FY 1984. Remote wind sensor systems will be procured for Fort Greely, AK, and Yuma Proving Ground, AZ, and a digital radar to support near millimeter propagation investigations will be procured for WSMR. The annual Smoke Week will be conducted for the developers of EO devices. Emphasis will be upon improving prediction capability of mathematical models and use of models in lieu of costly field tests. Tests of AAH/HELLFIRE/TADS under obscured conditions will be completed. ADTA will continue to conduct development tests of aircraft systems and components. Funding for the DARCOM Test Facilities Management Office will be continued with emphasis on avoiding duplication and pursuing standardization and joint efforts, whenever possible. Project D623 efforts will include multi-computer data communications, advanced video techniques, electro-optical target development, wideband coherent electro-optical information processing system and ballistic holography. Test methodology efforts will continue in areas such as development of realistic mathematical models of component performance and simulation techniques to stress components in a controlled fashion to enable evaluation under complex environments, to reduce test costs and duration, and to shorten the materiel development cycle; and development of techniques for test of directed energy systems and countermeasures equipment.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D618 Title: Aircraft Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: This project provides for the fixed and recurring costs incurred by the Aircraft Development Test Activity (ADTA) (formerly part of the Aviation Test Board), Ft Rucker, AL, a field element of the US Army Test and Evaluation Command (TECOM), during the conduct of developmental testing (DT) of Army aircraft. Fixed and recurring costs include an aircraft maintenance contract, salaries of civilian test personnel, host support, instrumentation and supplies. DT is conducted to demonstrate that design risks have been minimized, that the engineering development process is complete and that the system will meet specifications. The technical performance, safety, reliability, and maintainability characteristics of the system are measured during DT. ADTA also gathers data to aid in determining component service life, repair parts consumption, required inspection cycles, and in developing quick change kits and modifications. Prior to FY 1976, Project D618 funded the six Army test boards which were then under TECOM. Five of the boards were transferred to the US Army Training and Doctrine Command (TRADOC), 1 July 1975, and were financed by a new project, DV02, Test Boards. Effective 1 July 1976, the operational testing (OT) activities of the sixth board, the Aviation Test Board, were transferred to TRADOC under Project DV02. Most of the effort of the old Aviation Test Board consisted of DT activities. Responsibility for these activities was assigned to the new Aircraft Development Test Activity, which remained under TECOM, and continued to be financed by Project D618.

B. RELATED ACTIVITIES: Close and continuous coordination exists with other test and evaluation activities, TRADOC, materiel developers, and the US Army Operational Test and Evaluation Agency (OTEA) to insure optimum effectiveness of DT/OT. The Office of the Secretary of Defense reviews the operation of all Department of Defense test facilities to avoid unnecessary duplication of effort among the Services. Prior to FY 1976, limited instrumentation procurement for ADTA was funded as special purpose equipment under Program Element (PE) 6.58.01.A, Programwide Activities. This is now accomplished under this Program Element (Project D618).

C. WORK PERFORMED BY: Testing is performed by in-house military and civilian personnel. Aircraft (fixed and rotary) maintenance is performed on a contractual basis at a cost of $3.8 million annually. Current contractual effort is performed by Northrop Worldwide Aviation Services, AL.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The level of testing effort increased substantially in FY 1978 compared to prior years. As a result, ADTA instituted a policy of charging users for the direct costs of tests and began to execute this policy in FY 1978. ADTA conducted tests on the following: Utility Tactical Transport Aircraft System (now BLACKHAWK), CH-47 engines,

Project: #D618 Title: Aircraft Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Iranian Helicopter 214A, Advanced Attack Helicopter (AAH), UH-1 utility hoist, tail rotor blade assemblies, self-sealing hose, anti-collision lights, UH-1H stabilizer bar tube assembly, cleaning and de-icing system, XM91 flight line tester, improved bell scoop for UH-1. Procurement of instrumentation included replacement of obsolete photo/video instrumentation.

2. FY 1979 Program: The level of testing effort will increase compared to FY 1978. Examples of equipment scheduled for testing are: BLACKHAWK, AAH, AH-1Q Flight Simulator, Radar Jammer (AN/ALQ-136), Radar Warning Receiver (AN/APR-39), Small Portable Analyzer Diagnostic equipment, rotor assemblies, aviator helmets, training devices, and simulators for UH-60 and AH-1Q. Procurement of instrumentation includes a high frequency data acquisition system and data reduction equipment.

3. FY 1980 Planned Program: The level of effort is expected to remain approximately the same as the FY 1979 level of effort. FY 1980 funding is increased compared to FY 1979 funding to provide for inflation. Examples of equipment planned for testing are: CH-47C/D reliability, availability, and maintainability (RAM) data collection, BLACKHAWK RAM data collection, UH-1H Main Rotor Assembly, UH-1H Gearbox, (AN/ALQ-156) Missile Detector System, (AN/ALQ-144) Countermeasure Set, and CH-47 helicopter modifications. Instrumentation improvement and modernization planned for this period will include completion of prior improvements in order to enhance airborne data acquisition and analysis capabilities.

4. FY 1981 Planned Program: Equipment planned for testing will include: CH-47C modifications, tail rotor hub and blade installation on AH-1G, AAH, and tail rotor shaft hangar bearings (UH-1H). Procurement of instrumentation will include a mobile data reduction system and modernization of a variety of test and calibration equipment.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5728	5971	6285	6283	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	5362	5971	6358	--	Continuing	Not Applicable

FY 1978 funding increased compared to last year's estimate to provide for actual costs of operating the Aircraft Development Test Activity (ATDA). The current FY 1980 estimate has been decreased slightly anticipating additional user charges.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.06.A
DoD Mission Area: #610 - Technical Integration

Title: Materiel Systems Analysis
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8715	9300	10279	11179	Continuing	Not Applicable
M541	US Army Materiel Systems Analysis Agency (AMSAA)	8715	9300	10279	11179	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides central independent technical capability in US Army Materiel Development and Readiness Command (DARCOM) for the conduct of major materiel systems performance effectiveness analyses and cost effectiveness evaluations. AMSAA provides similar support to US Army Training and Doctrine Command (TRADOC), US Army Operational Test and Evaluation Agency (OTEA), Headquarters, Department of the Army, and Office of the Secretary of Defense. Such support is either funded by the customer or absorbed by AMSAA out of this program element. As the DARCOM lead activity for survivability, as well as its center for reliability, availability, and maintainability (RAM) methodology AMSAA conducts analyses of these aspects of materiel systems. AMSAA maintains direct contact with Army materiel users in the field to ascertain requirements for improvements.

C. BASIS FOR FY 1980 RDTE REQUEST: Complete analyses and evaluations started in FY 1979 and initiate new analyses and evaluations in support of taskings from DARCOM and other commands/activities noted in paragraph B. Emphasis will be on review of major systems and alternatives and trade-offs that might be considered in order to reduce cost of procurement and systems operations and support.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	8715	9700	11080	Continuing	Not Applicable

The difference in FY 1979 funding is a result of a Congressional reduction. FY 1980 estimate is reduced due to increased reliance on customer funding.

E. OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: #6.57.06.A
DoD Mission Area: #610 - Technical Integration

Title: Materiel Systems Analysis
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: US Army Materiel Systems Analysis Agency (AMSAA) is a sub-activity of US Army Materiel Development and Readiness Command (DARCOM). Its primary objective is to conduct independent systems analyses and cost effectiveness evaluations of major materiel systems. It provides estimates of Army materiel performance for the total spectrum of combat environments. This encompasses assessing the expected worth of and anticipated costs associated with existing and proposed Army materiel systems throughout their life cycle to provide a meaningful basis for major decisions concerning their design, development, acquisiton, employment, and deployment. The Advanced Attack Helicopter, XM1 tank, PATRIOT system, and BLACK HAWK Utility Tactical Transport Aircraft are examples of specific projects worked on by AMSAA. AMSAA serves as the DARCOM center for reliability, availability, and maintainability (RAM) methodology and conducts analyses of the RAM aspects of materiel systems. AMSAA serves as the DARCOM lead activity for survivability and conducts survivability analyses of materiel systems. AMSAA also maintains direct contact with Army materiel users in the field to ascertain requirements for improvement of fielded materiel, to evaluate these requirements, and to seek timely solutions through application of current and emerging technology. AMSAA is located at Aberdeen Proving Ground, MD.

G. RELATED ACTIVITIES: AMSAA is the Army executive agent for the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) which has the responsibility for managing the technical and fiscal aspects of the JTCG/ME program for the Steering Committee in coordination with HQ DARCOM and the military services. This involves systems analysis and testing in an effort to determine the effectiveness and performance of the operational weapons/munitions systems of all military services. JTCG/ME is financed by program element 6.58.05.A, Project D620, Munitions Effectiveness and Explosives Safety Standards. AMSAA also designs development tests to provide the basis for independent evaluations which contribute to decisions with respect to acquisition of major and selected nonmajor materiel systems. Inherent in this responsibility is monitoring of developmental tests and providing a complete and independent evaluation of the worth of the system. AMSAA is currently tasked with approximately 70 such systems. Test design and evaluation is financed by project D026, Test Design and Evaluation, Program Element 6.57.02.A, Support of Development Testing.

H. WORK PERFORMED BY: Approximately 5% of the effort, representing expertise not available in-house, is conducted under contract for AMSAA; the rest is performed in-house by AMSAA personnel. Potential contractors cannot be identified until work requirements are determined.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Examples of tasks completed are: recommended design changes to the M60A1E3 series tanks, feasibility of employing anti-aircraft weapons for nuclear site defense, COBRA investigation regarding the critical issues relating to helicopter mast-mounted sights, determination of the susceptibility of the Advanced Attack Helicopter (AAH) to attack by Red artillery, methodology for assessing logistics and the air-to-surface war (AFSOUTH wargame), evaluation of relative performance of 8 inch lightweight gun as a candidate to replace 5 inch guns on Navy ships. Evaluations were accomplished in support of new main battle tank and surface-to-air missile development (SAM-D) programs. Studies of useful life of 2-1/2 ton truck indicated

that optimum replacement life is 15 years as contrasted with the existing 12-year replacement life policy. This represented a potential cost savings of $100 million. Major contributions were made in the area of smoke and its influence on the battlefield. Serves as consultant to Program Manager, Smoke.

2. FY 1979 Program: Continue independent evaluation of XM1 tank system emphasizing the results of development testing for the Army Systems Acquisition Review Council (ASARC) and Defense Systems Acquisition Review Council (DSARC). Continue support of Army special studies and international panels relative to weapon effectiveness and requirements for interoperability. Operating and support cost methodologies will be developed to permit long term cost estimates to be made for systems. Provide a basis for trading off firepower, mobility, and survivability for lightweight armored combat vehicles (ACVT). Continue participation in preparation of analysis plan for North Atlantic Treaty Organization (NATO) small arms evaluation to select a second caliber of ammunition for standardization. Perform effectiveness analyses of AAH weaponization, ASH, and Interim Scout candidates. Analyze effectiveness of air defense systems in electronic countermeasures and adverse weather environments. Examine alternative designs of equipment in varying tactical employments. Continue analysis of combat service support survivability after initial enemy strikes. Analyze the STINGER, ROLAND, and PATRIOT advanced development system survivability. Analyze survivability of aircraft (AAH, AH1 Series) attacked by high energy laser weapons. Emphasize applications of new technology to fielded equipment, provide guidance to developers of new equipment and assist in the formulation of all new requirements documents. Investigate workloads and test machine characteristics in order to recommend the mix of automatic test equipment (ATSS) best suited for direct support, general support, and depot shops. Improved feedback of properly analyzed field operational and support data will be emphasized to guide design engineers and developers toward weapon systems with increased readiness potential. Expand emphasis from finding specific "fixes" of equipment and enhancing user satisfaction to include the broader goal of improving materiel readiness. Review advantages of proposed DRAGON Product Improvement Programs (PIP's) and various follow-on concepts, assist SHAPE task force regarding improving North Atlantic Treaty Organization (NATO) antitank posture, determine best alternatives for NATO in a limited visibility (SMOKE) battlefield environment, examine methodology to develop procedures for use in a Quality Readiness Review (QRR), design a test of close air support effectiveness in an electronic warfare environment. Complete evaluations pertaining to VIPER, Ground Emplaced Mine Scattering System (GEMSS), Air Defense Gun, ROLAND and PATRIOT Air Defense Systems, Vulcan Air Defense Gun Product Improvement Programs, second prototype of Advanced Medium STOL Transport (AMST) aircraft, and the Family of Military Engineering Construction Equipment (FAMECE). The workload represents a level of effort of approximately 330 man years to support the systems analysis of Army materiel requirements.

3. FY 1980 Planned Program: Continued analyses and evaluation will be required for the general families of items such as helicopters, small arms, tank-antitank weapons, missiles, and communications equipment. Many of these will be carried over from the previous fiscal year since the developments evolve over a number of years. Tasks will include analyses of night operations, survivability, firepower, mine emplacement concepts, artillery optimization, utilization of missiles, and various antiarmor techniques. Emphasis will be placed on reviewing major systems and alternatives and trade-offs that might be considered in order to lower the cost of materiel procurement and system operations and support. There will also be emphasis on maximizing

survivability, reliability, availability, and maintainability of developed items. Specific projects are: Attack Helicopter Study-Phase II; Battlefield Availability of Artillery-Phase I; Advanced Forward Area Communications; battlefield performance of antitank guided missile systems (TOW, DRAGON, TOW-COBRA, foreign threat missile, TOW on APC, HELLFIRE, and COPPERHEAD (laser-guided weapons)); chemical warfare assessment; helicopter weapons systems assessment; communication, electronic, and command and control systems assessment; armor weapon system performance quantification (tank armor, tank fire control, and antitank munitions); lethality updates of ROLAND, PATRIOT and DIVAD gun.

4. FY 1981 Planned Program: Continue independent systems analysis and cost-effectiveness evaluations of developmental materiel systems with emphasis in the same general areas as in FY 1980.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.07.A

Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	15044	21990	26935	28173	Continuing	Not Applicable
DV02	Test Boards	9580	11718	12218	12169	Continuing	Not Applicable
DV03	Initial Operational Test & Evaluation (IOTE)	1711	4837	6617	5764	Continuing	Not Applicable
D918	Communications-Electronics User Testing	1061	0	535	600	Continuing	Not Applicable
M985	Concepts Evaluation of Materiel	1164	2000	2200	2200	Continuing	Not Applicable
D986	Support Equipment	1528	3435	5365	7440	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct the operational testing (OT) of Army systems under development to support decision making related to materiel acquisition programs. It consists of five projects: DV02, Test Boards, provides for the recurring costs of operating the TRADOC Test Boards; DV03, Initial Operational Test and Evaluation (IOTE), provides for the direct costs of operational tests of nonmajor developmental materiel prior to production; D918, Communications-Electronics User Testing, provides resources for tests of US Army Communications Command equipment; M985, Concepts Evaluation of Materiel, provides an economical test vehicle via quick reaction testing of materiel to determine Army needs; and D986, Support Equipment, develops instrumentation for TRADOC test organizations.

C. BASIS FOR FY 1980 RDTE REQUEST: Requested funds provide for operational testing on assigned systems, for operation and maintenance of the Test Boards, and for development of instrumentation, targets and simulators to enable efficient and effective testing. The Test Boards will be fully staffed for the entire year since organizational activities are being completed in FY 1979.

Program Element: #6.57.07.A

Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	14000	19991	22254	Continuing	Not Applicable

1. Project D918, funded for FY 1978 under Program Element (PE) 6.57.01.A, Communications-Electronics Testing Activities, included $1061 thousand for operational testing of electronic warfare and signal intelligence (EW/SIGINT) equipment which is now conducted by TRADOC and funded by PE 6.57.07.A.

2. Most of the increase in FY 1979 funding is required to pay the fixed and recurring costs of the Test Boards at FY 1979 staffing levels.

3. The increase in FY 1980 funding is due to an increase in IOTE costs due to program revisions and refinement of cost estimates to include: added tests of the Fire Support Team Vehicle, Tactical Control and Analysis Center, Quick-Reaction Multi-color Printer, and Improved Conventional Mine System; attainment in FY 1980 of full staffing for the 8 Test Boards (including the newly established Communications-Electronics Board); inflation; and provision of funding for testing certain communications equipment (primarily fixed site), formerly the responsibility of the US Army Communications Command.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.07.A

Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Project DV02, Test Boards, provides for the fixed and recurring costs of the TRADOC Test Boards which conduct operational testing (OT) and force development testing and experimentation (FDTE) in support of TRADOC, US Army Operational Test and Evaluation Agency (OTEA) and other agencies, to include Office of the Secretary of Defense (OSD) joint tests. The direct costs of FDTE are funded under the Operations and Maintenance, Army Appropriation. Organization of the boards under TRADOC was begun in FY 1976 and will be completed in FY 1979, with FY 1980 being the first full year of operation with fully staffed test boards. Project DV03, Initial Operation Test and Evaluation (IOTE), provides for the direct costs of operational tests of nonmajor developmental materiel prior to production. RDTE funding for this purpose was initiated in FY 1977. Project D918, Communications-Electronics User Testing, provides resources for testing of US Army Communications Command equipment. Such testing is conducted primarily on-site. FY 1980 is the first year in which such testing will be funded under a separate project. Project M985, Concepts Evaluation of Materiel, provides US Army Training and Doctrine Command commanders with a quick, simple process for resolving and solidifying combat development and training development thinking pertinent to potential new materiel requirements or improvements. This has proven far more cost effective than resolving such issues later in the materiel development cycle. Project M985 was initiated in FY 1975. Project D986, Support Equipment, provides for the development of instrumentation in support of user testing by TRADOC. This project also provides for development of threat weapon simulators, tank targets and other targets used to establish a realistic environment for user testing. User testing is conducted primarily at the Test Boards, TRADOC Combined Arms Test Activity (TCATA) and the Combat Developments Experimentation Command (CDEC). Project D986 was initiated in FY 1973. Prior to FY 1977, a separate project, D952, TRADOC Combined Arms Test Activity (TCATA), formerly Modern Army Selected Systems Test, Evaluation and Review (MASSTER), provided for the development of instrumentation in support of user testing by TCATA. Project D952 was merged into Project D986, Support Equipment, starting in FY 1977.

G. RELATED ACTIVITIES: The Army Staff directs close and continuous coordination between TRADOC agencies responsible for test and use of materiel items, development test activities, materiel developing agencies, and OTEA to insure greatest possible effectiveness of Army testing activities and to avoid duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering (OUSDRE) reviews planned testing and development of support equipment to insure integration of testing by the Services, and to avoid duplicate developments of instrumentation. Threat simulator requirements are coordinated with the other services through a USDRE-chartered tri-Service committee. Full time liaison personnel are assigned by each of the services to appropriate test activity headquarters of other services. High level centralized management of resources for user testing is provided by the US Army Test Schedule and Review Committee, whose principal product is the Army Five Year Test Program. The Five Year Test Program represents the Army's plan for IOTE and Follow-On Evaluations of all materiel items and for testing in support of force development for the following five years. Its execution is supervised by OTEA. Operational tests of the acceptability of major and selected nonmajor developmental materiel items are conducted by OTEA under Program Element (PE) 6.57.12.A, OTEA Operational Testing. In FY 1978, project DV02, Test Boards, and Project M985, Concepts Evaluation of Materiel, were transferred into this PE from PE 6.57.02.A, Support of Development Testing, and PE 6.57.06.A, Materiel Systems Analysis, respectively. The purpose for the transfer was to consolidate, into one PE, TRADOC RDTE activities in support of user

testing. Operational testing activities formerly conducted by the US Army Security Agency using part of the funding in PE 6.57.01.A, Communications-Electronics Testing Activities, are funded under this PE starting in FY 1979 (under projects DV02 and DV03).

H. WORK PERFORMED BY: Initial Operational Test and Evaluation (IOTE) is primarily conducted in-house assisted by available local troop support. Instrumentation development is primarily contract effort. Contractors include: TRACOR, Inc., Austin, TX; General Dynamics Corp., San Diego, CA; General Electric, Syracuse, NY; International Laser Systems, Orlando, FL; and MILGO, Inc., Miami, FL. Some instrumentation development is performed in-house by Harry Diamond Labs, Adelphi, MD; Naval Postgraduate School, Monterey, CA; and the US Army Missile Research and Development Command, Redstone Arsenal, AL. US Army Training and Doctrine Command Combined Arms Test Activity (TCATA), Combat Developments Experimentation Command (CDEC), and the Test Boards are staffed by military and civilian personnel.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: A major effort was begun in FY 1973 to upgrade instrumentation at CDEC and TCATA. Main emphasis was on development of integrated field instrumentation including central test data processing, automatic data collection, (moving) target position location and weapons engagement scoring. Development was also begun of targets for a live firing range and of a family of threat weapon simulators. The mission of the Test Boards was revised and the Boards were transferred from US Army Test and Evaluation Command (TECOM) to TRADOC starting in FY 1976 in order to provide the operational tester with unqualified independence of the developing agency. Starting in FY 1977, instrumentation was also developed (under project D986, Support Equipment) for the Test Boards with the aim of rebuilding and reorienting their instrumentation toward efficient and effective conduct of operational testing of developmental systems. RDTE funding was initiated in FY 1977 for conduct of IOTE by TRADOC. Sixty-two IOTEs were conducted prior to FY 1977 and funded by Operations and Maintenance, Army. TRADOC Concepts Evaluations were initiated in FY 1975; examples are helicopter night operations, airborne infantry survivability, remotely piloted vehicles, mini-jammers, small-scale computers, laser alarms, hostile aircraft identification, mobile weapons system for rear area security, camouflage for self-propelled artillery and early-warning communications. These efforts proved highly useful in resolving issues related to new or improved materiel concepts.

2. FY 1979 Program: TRADOC will conduct approximately 65 operational tests in FY 1979. These include tests of Multiple Target Electronic Warfare Systems, Surface Launched Unit-Fuel Air Explosive, Multiple Integrated Laser Engagement System, Ground Emplaced Mine Scattering System, Explosive Foxhole Digger, Ribbon Bridge Erection Boat, Protective Mask, Facility Intrusion Detection System, Small Unit Transceiver (Field Artillery Phase), and AN/TSQ-109 Automated Ground Transportable Emitter Location Identification System. Concepts Evaluations will include: individual tactical air vehicle for rear area, personnel parachute modification, rough terrain hydraulic crane, and cleaning procedures for conversion of petroleum containers to water services.

Instrumentation, targets, and simulators essential to effective operational testing of materiel systems in a realistic environment, to include threat, will also be developed.

3. FY 1980 Planned Program: Seventy-five operational tests are planned for FY 1980. These tests will be conducted at the eight TRADOC test boards (including the newly formed Communications-Electronics Board), and at the TRADOC Combined Arms Test Activity. Tests include: Fire Support Team Vehicle, Tactical Control and Analysis Center, Quick-Reaction Multicolor Printer, Improved Conventional Mine System, Armored Combat Vehicles, VINSON-TACFIRE Communication Security System, XM1 Unit and M60A3 Conduct of Fire Trainers, and LEFOX GREY and CEFIRE TIGER electronic warfare systems. Funds are increased substantially over FY 1979 to provide for full staffing of the Test Boards for the entire year, after completion of organizational activities in FY 1979; to provide for an increase in number and scope of operational tests; and to initiate development of a Mobile Automated Field Instrumentation System (MAFIS) which will provide TRADOC with a highly mobile, self-contained capability to support testing at any installation where troops and suitable terrain are available. MAFIS will reduce impact of testing on readiness, reduce TDY costs and increase realism.

4. FY 1981 Planned Program: Continue to support operational testing by TRADOC. Examples of tests scheduled include Nuclear Burst Detection System, Mobile Army Ground Imagery Interpretation Center, Tank Weapons Gunnery Simulation System and Ultra High Level Container Airdrop System. There are 38 instrumentation projects scheduled for development in FY 1981.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV02 Title: Test Boards
Program Element: #6.57.07.A Title: US Army Training and Doctrine Command (TRADOC) Operational Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: Prior to FY 1976, the fixed and recurring costs incurred by six test activities of the US Army Test and Evaluation Command (TECOM), were financed by project D618, Aircraft Development Test Activity (formerly titled Test Boards), under Program Element (PE) 6.57.02.A, Support of Development Testing. These six test activities, or test boards, performed testing of developmental Army materiel prior to commitment to production with emphasis on service tests (i.e., on the soldier-materiel interface). Increased emphasis on independent operational testing led to a decision by the Army to transfer the boards to the US Army Training and Doctrine Command (TRADOC). The transfer is intended to provide the test agency with unqualified independence from the Army materiel developing agency. The transfer is also intended to provide clearer separation of development testing and operational testing. The term "operational testing" is now used to distinguish those tests of materiel conducted under conditions as close as possible to those encountered in actual field use with troops representative of those trained to employ the materiel. Operational testing is usually conducted by a test agency independent of the materiel developing agency. The term "development testing" is now used to distinguish tests of the acceptability of developmental materiel other than operational tests, prior to commitment to production. Development tests emphasize the measurement of technical performance, safety, reliability, and maintainability characteristics. Starting in FY 1976, the operational tests of developmental materiel by the five TRADOC test boardswere financed by this project, DV02. The Aviation Board, Fort Rucker, AL, was formed by TRADOC in Fall 1976 to conduct operational testing of aviation systems. Formerly, such testing was performed by a TECOM test activity, now called Aircraft Development Test Activity, funded by project D618 in PE 6.57.02.A, Support of Development Testing. Starting in FY79, the seventh and eighth testing elements were added: The Intelligence and Security (I&S) Board, Ft Huachuca, AZ, and the Communications-Electronics (C-E) Board, Ft Gordon, GA. In FY 1977 and prior years, operational testing of signal intelligence and electronic warfare equipment was performed by the US Army Security Agency Test and Evaluation Center. In FY 1978 and prior years, this type testing was supported under PE 6.57.01.A, Communications-Electronics Testing Activities. The C-E Board was activated 1 July 1978 at Ft Gordon with the nucleus obtained from reorganization of the Airborne-Communication-Electronics (ACE) Board at Ft Bragg, NC. The ACE Board has been redesignated as the Airborne (ABN) Board. Besides the Aviation, C-E, I&S and ABN boards, the other boards are: US Army Air Defense Board, Ft Bliss, TX; US Army Armor and Engineer Board, Ft Knox, KY; US Army Field Artillery Board, Ft Sill, OK; and the US Army Infantry Board, Ft Benning, GA. Each board relies upon Temporary Duty personnel during the conduct of tests. The collocated combat arms center and school is the principal source of those personnel.

B. RELATED ACTIVITIES: Close and continuous coordination exists between the test boards, TRADOC agencies responsible for use of materiel items, TECOM, materiel developing agencies, and the US Army Operational Test and Evaluation Agency (OTEA) to insure optimum effectiveness of Army test activities. High level centralized management of resources for user testing is provided by the Test Schedule and Review Committee, whose principal product is the Army Five Year Test Program, the Army's plan for operational testing of all materiel items and for testing in support of force development for the following five years. OTEA

supervises execution of the Five Year Test Program, which includes most of the test boards' programs. The Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all Department of Defense test facilities and planned testing to avoid unnecessary duplication of efforts/facilities, to insure that highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services. In addition to operational testing activities, TRADOC Test Boards also conduct force development testing and experimentation (FDTE) funded by the Operations and Maintenance, Army appropriation and conduct other tests, in support of elements of TRADOC and other Army commands, financed by the customer. FDTE is conducted to permit evaluation of new concepts of tactics, doctrine, organization and training. Two other activities also support user testing, the TRADOC Combined Army Test Activity (TCATA) and the Combat Developments Experimentation Center (CDEC). Operational tests of the acceptability of major and selected nonmajor developmental materiel are conducted by the US Army Operational Test and Evaluation Agency (OTEA) with funding provided under Program Element (PE) 6.57.12.A, OTEA Operational Testing. In those instances when the test boards support OTEA operational tests, costs directly attributable to conduct of the tests are reimbursed by OTEA. Similarly, the direct costs of tests in support of TRADOC operational tests are reimbursed from project DV03, Initial Operational Test and Evaluation, under this PE 6.57.07.A.

C. WORK PERFORMED BY: The salaries of civilian personnel assigned to the test boards are paid primarily from this project. A minor portion of project funds are spent for numerous small contracts for services such as machine rentals and maintenance, and for equipment and supplies attributable to support of operational tests of developmental materiel, but not identifiable with an individual test.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: In FY 1975 and prior years, the Test Boards were under US Army Test and Evaluation Command (TECOM) and conducted engineering and service tests of Army developmental materiel. At the start of FY 1976, five boards were transferred from US Army Test and Evaluation Command (TECOM) to TRADOC. At the start of FY 1977, a sixth board was formed by TRADOC, the Aviation Board, to assume responsibility for operational testing of aviation systems formerly performed by a TECOM test activity (project D618, Aircraft Development Test Activity, in PE 6.57.02.A, Support of Development Testing). At the start of FY 1978, a seventh board, the Intelligence and Security (I&S) Board, was established to assume responsibility for operational testing of signal intelligence and electronic warfare equipment formerly performed by the US Army Security Agency Test and Evaluation Center, as part of activities funded under PE 6.57.01.A, Communications-Electronics Testing Activities. These boards conducted operational tests and evaluations and other tests as directed by Department of the Army and further described under project DV03, Initial Operational Test and Evaluation (IOTE).

Project: #DV02 Title: Test Boards
Program Element: #6.57.07.A Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: Funding for the I&S Board is provided under Program Element (PE) 6.57.07.A at the start of FY 1979. An eighth board, Communications-Electronics (C-E) Board, was established at Ft Gordon, GA, and assumed responsibility for operational testing of C-E systems, formerly performed by the Airborne-Communications-Electronics (ACE) Board. This completes the organizational activities begun in FY 1976. All the boards will be fully staffed by the end of FY 1979. The eight boards are conducting tests and evaluations as described under project DV03, Initial Operational Test and Evaluation (IOTE).

3. FY 1980 Planned Program: FY 1980 will be the first time that the test boards will be fully staffed for the entire year. This project will continue to provide for the fixed and recurring costs of the eight test boards. The boards will continue to conduct operational testing (OT) and force development testing and experimentation (FDTE) in support of TRADOC, US Army Operational Test and Evaluation Agency (OTEA) and other agencies, to include the Office of the Secretary of Defense (OSD)-directed joint tests.

4. FY 1981 Planned Program: This project will continue to provide for the operation and maintenance of the TRADOC test boards.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	9580	11718	12218	12169	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	8815	10080	10054	-	Continuing	Not Applicable

The FY 1978 and FY 1979 increases are required to pay the fixed and recurring costs of the Test Boards at the FY 1978 and FY 1979 staffing levels. The FY 1980 increase is required to maintain full staffing for the entire year of the 8 Test Boards, including the newly established Communications-Electronics Board, and to provide for inflation.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV03 — Title: Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.07.A — Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities — Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to provide for the direct costs of conducting operational testing (OT) prior to the production decision for the TRADOC-proponent nonmajor systems. All TRADOC operational tests are programed through the Department of the Army (DA) Test Schedule and Review Committee (TSARC) whose principal function is to schedule and manage the Army Five Year Test Program. The TSARC meets semi-annually to update user testing for the Army. TRADOC test organizations conduct programed tests which address specific materiel acquisition programs, assessing military utility, operational effectiveness and suitability, including compatibility, interoperability, reliability, maintainability, and logistic and training requirements. Operational testing also provides information on organization, personnel requirements, doctrine and tactics. Test organizations rely on US Army Forces Command (FORSCOM) to provide representative user troops for the conduct of these tests. Principal TRADOC organizations involved in IOTE are: the Airborne, Air Defense, Armor and Engineer, Aviation, Communications-Electronics, Field Artillery, Infantry, and Intelligence and Security Boards; and the US Army TRADOC Combined Arms Test Activity (TCATA).

B. RELATED ACTIVITIES: Close and continuous coordination exists between the various TRADOC proponents and test organizations, the US Army Test and Evaluation Command (TECOM) test activities, and the materiel developers to ensure optimum effectiveness and to avoid duplication of effort. Coordination with the US Army Operational Test and Evaluation Agency (OTEA) is maintained to facilitate all OT. TRADOC test organizations also conduct customer evaluations for organizations outside of the TRADOC community on a reimbursable basis. These test organizations also conduct Force Development Test and Experimentation (FDTE) using OMA funding to evaluate new concepts of tactics, doctrine, organization and materiel.

C. WORK PERFORMED BY: Work is performed primarily by in-house personnel assigned to TRADOC. Available local troop support is provided as required to assist in the testing and evaluations.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: RDTE funding for IOTE was initiated in FY 1977. Prior financing for direct costs of IOTE was under the Operations and Maintenance, Army Appropriation. Operational tests conducted by TRADOC in FY 1977 include Lightweight Doppler Navigation System, radio data link and 30-Ton Lighter Air Cushion Vehicle. FY 1978 tests include: "Soft" Ring Airfoil Grenade, Surface-Launched Unit Fuel-Air Explosive, and Ultra High Frequency Tactical Satellite Communications Manpack. Examples of results of OT are: recommendations to enter production for the Lighter Air Cushion Vehicle and the VINSON Communications Security System and recommendations to delay procurement for the Air Traffic Control Tower and the Lightweight Doppler Navigation System pending correction of deficiencies found during testing.

Project: #DV03 Title: Initial Operational Test and Evaluation (IOTE)
Program Element: #6.57.07.A Title: US Army Training and Doctrine Command (TRADOC) Operational Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: TRADOC will conduct approximately 65 operational tests in FY 1979. These include: Multiple Target Electronic Warfare System (Rotary Wing); Multiple Integrated Laser Engagement System; Advanced Radar Warning Receiver; Transportable Automated Electromagnetic Compatibility Measurement System; Infrared Aiming Light; Ground Emplaced Mine Scattering System; Surface Launched Unit-Fuel Air Explosive; Explosive Foxhole Digger; Ribbon Bridge Erection Boat; Protective Mask; Facility Intrusion Detection System; Small Unit Transceiver (Field Artillery Phase); and AN/TSQ-109 Automated Ground Transportable Emitter Location Identification System.

3. FY 1980 Planned Program: Seventy-five operational tests are planned for FY 1980. These tests will be conducted at the eight TRADOC test boards (including the newly formed Communications-Electronics Board), and at the TRADOC Combined Arms Test Activity. Tests include: XM1 Unit Conduct-of-Fire Trainer; Fire Support Team Vehicle; High Accuracy Airborne Location System; Quick-Reaction Multicolor Printer; Tactical Control and Analysis Center; Improved Conventional Mine System; LEFOX GREY and CEFIRE TIGER electronic warfare systems; VINSON-TACFIRE Communication Security System: Armored Combat Vehicles; and M60A3 Conduct-of-Fire Trainer.

4. FY 1981 Planned Program: TRADOC will continue to conduct operational testing. Examples of tests scheduled include: Nuclear Burst Detection System, Mobile Army Ground Imagery Interpretation Center, Tank Weapons Gunnery Simulation System, and Ultra High Level Container Airdrop System.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1711	4837	6617	5764	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	2761	4476	4000	-	Continuing	Not Applicable

Other Appropriations: Not Applicable.

Project: #DV03 Title: Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.07.A Title: US Army Training and Doctrine Command (TRADOC) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

The FY 1978 decrease resulted from numerous program revisions including slippage of several tests to later years. These funds were reprogramed to other projects in the same program element, primarily to expedite staffing of newly organized test boards. The FY 1979 and FY 1980 increases are due to program revisions (including slippage from FY 1978), and refinements of estimated costs for conducting tests assigned to TRADOC by the Department of the Army (DA) Test Schedule and Review Committee. Significant increases in FY 1980 costs include added tests of: Fire Support Team Vehicle; Tactical Control and Analysis Center; Quick-Reaction Multicolor Printer; and Improved Conventional Mine System.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D986
Program Element: #6.57.07.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Support Equipment
Title: US Army Training and Doctrine Command (TRADOC) Operational Testing
Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: A major effort was begun in FY 1973 to upgrade instrumentation at the Combat Developments Experimentation Center (CDEC) and US Army Training and Doctrine Command (TRADOC) Combined Arms Test Activity (TCATA) (formerly Modern Army Selected Systems Test, Evaluation, and Review (MASSTER)). Main emphasis was on development of integrated field instrumentation including central test data processing, automatic data collection, (moving) target position location, and weapons engagement scoring. Development was also begun of targets for a live firing range and of a family of threat weapon simulators. The Army's Air Defense Artillery Threat Simulator (ADATS) Program was assigned to TRADOC in FY 1974-75. This program provides the Army with simulated threat equipment to support User Testing by duplicating/simulating opposing force Air Defense threats to create a realistic test environment. At the beginning of FY 1976, the US Army Test and Evaluation Command (TECOM) transferred five Test Boards to TRADOC for conduct of Operational Testing (OT). The test boards possessed no adequate instrumentation to support this test mission. Since then, the test boards, including three recently established boards, are rebuilding and reorienting their instrumentation. Project D986, Support Equipment, now provides for the development of instrumentation in support of user testing by TRADOC. This project also provides for development of threat weapon simulators, tank targets, and other targets used to establish a realistic environment for user testing. User testing is conducted primarily at the Test Boards, TCATA, and CDEC. User testing comprises OT of materiel systems in a user environment to assess its operational suitability and Force Development Testing and Experimentation (FDTE) for evaluation of new concepts of tactics, doctrine, and organization. TRADOC test activities use the equipment developed under this project in support of US Army Operational Test and Evaluation (OTEA) tests and Office of the Secretary of Defense (OSD) directed joint tests as well as during conduct of TRADOC user tests.

B. RELATED ACTIVITIES: The Army Staff directs close and continuous coordination between TRADOC agencies responsible for test and use of materiel items, development test activities, materiel developing agencies, and the US Army Operational Test and Evaluation Agency (OTEA) to ensure greatest possible effectiveness of Army testing activities and to avoid duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering (OUSDRE) reviews planned testing and development of support equipment to ensure integration of testing by the Services, and to avoid duplicate development of instrumentation. Threat simulator requirements are coordinated with the other Services through a USDRE-Chartered tri-Service Committee (CROSSBOW-S). Coordination is also maintained with the training developments activities with respect to targetry required for testing.

C. WORK PERFORMED BY: Work is performed in-house and by numerous contractors. Approximately 20-25 development projects are initiated each year. Many of the projects are unrelated and many contractors are involved. In-house organizations include: Harry Diamond Laboratories, Adelphi, MD; Naval Postgraduate School, Monterey, CA; US Army Missile Research and Development Command, Redstone Arsenal, AL; and CDEC, Ft Ord, CA. Past contractors include: TRACOR, Austin, TX; General Dynamics Electronics, San Diego, CA; International Laser Systems, Orlando, FL; General Electric, Syracuse, NY; and MILGO Inc., Miami, FL. All contracts are awarded through competitive bidding.

Project: #D986
Program Element: #6.57.07.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Support Equipment
Title: US Army Training and Doctrine Command (TRADOC) Operational Testing
Budget Activity: #6 - Defensewide Mission Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Combat Developments Experimentation Center (CDEC) and TRADOC Combined Arms Test Activity (TCATA) initiated and continued long term integrated instrumentation development programs to enable maximum realism and simulation portrayed in a total tactical environment for conduct of Force Development Testing and Experimentation (FDTE). Starting in FY 1976, this project also provided for development of instrumentation for the Test Boards. The instrumentation includes sophisticated systems that are designed for particular test purposes and provides for automatic collection of such data as system location and position, live fire hit/miss indication, simulated direct and indirect fire hit/miss, and range timing. Specific accomplishments include development of: Range Measuring System at CDEC; Position Recording and Reporting System; Automatic Data Collection System and Weapons Engagement Scoring System at TCATA; XM76S, XM584S, and XM42S Threat Simulator Systems at the US Army Air Defense School for the Army's Air Defense Artillery Threat Simulator (ADATS) program; Target Spotting System at Armor and Engineer Board; Range Control Instrumentation System at Air Defense Board; Tracking System for Airborne Testing at Airborne Board; and Direct Fire Laser System at TCATA and CDEC for hit/kill simulation.

2. FY 1979 Program: Twenty instrumentation projects for TRADOC test activities are planned to provide support for future Army User Testing. Examples are: modification of weapons engagement scoring system and development of position data-communications modules at TCATA; direct fire stand-alone system, and indirect terminal effects simulator at CDEC; range scoring system for indirect fire at infantry and field artillery boards; data acquisition/reduction system at aviation board; and development of non-communications and communications threat environmental equipment at Intelligence and Security Board.

3. FY 1980 Planned Program: Emphasis will be placed on improving the methodology for and accuracy of the collection of hard and subjective type data in the areas of: equipment/systems mission performance; assessment of human factors; and logistics, maintenance, and training evaluations. A substantial effort will be made to provide the Test Boards with modern instrumentation critical to their operational testing mission. Twenty-six instrumentation projects are planned for FY 80. Examples are: Threat Simulators; Advanced Engagement Simulator at Armor and Engineer Board; Telemetry Acquisition System at Airborne Board; electronic warfare equipment, including Threat Communications and Noncommunications Emitters, at Intelligence and Security Board; Hit Sensing Telemetry System for Moving Targets at Infantry Board; Target Attitude System at CDEC; establishing communications-electronics test capability at new Communications and Electronics Board; and initiating development of TRADOC Mobile Automated Field Instrumentation System (MAFIS) at TCATA. MAFIS will utilize latest technology for Positon Location, Communications and Navigation, Real Time Casualty Assessments, Hit/Kill Probabilities, Weapon Simulation and Scoring, Data Integration and Analyses and will interface efficiently with other modern test instrumentation. MAFIS will provide TRADOC with a highly mobile and self-contained capability to support testing at any installation where troop resources are available. This will reduce impact of testing on troop readiness, reduce TDY costs, and increase realism.

Project: #D986
Program Element: #6.57.07.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title; Support Equipment
Title: US Army Training and Doctrine Command (TRADOC) Operational Testing
Budget Activity: #6 - Defensewide Mission Support

4. FY 1981 Planned Program: Thirty-eight instrumentation projects are scheduled for development in FY 1981. Examples are: Mobile Automated Field Instrumentation System (MAFIS) (continued development), Surface-to-Air Missile Scoring System, Smoke Environment Direct Fire Simulator, Advanced Engagement Simulator for Armor, Helicopter Hit-Miss Scoring System, and Smoke Penetrating Laser.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1528	3435	5365	7440	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	1488	3435	6000	--	Continuing	Not Applicable

FY 1980 decrease resulted from elimination of two relatively low priority projects.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.08.A
DoD Mission Area: #610 - Technical Integration

Title: Theater Nuclear Force Survivability (TNF/S) Analysis
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1390	1999	2480	2480	0	10459
A987	Theater Nuclear Force Survivability Analysis	1390	1999	2480	2480	0	10459

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The survivability of present and future theater nuclear-capable forces including combat, combat support, and combat service support elements must be determined in the context of a NATO/Warsaw Pact conflict. This effort will identify necessary changes in doctrine, tactics, or hardware required for achieving increased survivability. This Program Element (PE) provides part of the support (see paragraph E) for the US Army Training and Doctrine Command (TRADOC) "TNF/S Program." The funds are managed by the TRADOC TNF/S Program Manager to ensure no duplication of effort among the various PE's.

C. BASIS FOR FY 1980 RDTE REQUEST: Vulnerability assessment of selected systems will be continued during this period. Analytical Assessment models will be developed and data provided to other efforts of the TNF/S study. Blast, thermal, radiation, and ballistic survivability studies of radars, PERSHING, and helicopters will be accomplished. Doctrinal changes on the employment of LANCE and 155mm artillery that come from FY 1979-TNF/S recommendations will be integrated into data base and tested in the FY 1980 analytical effort. Hardware survivability recommendations for equipment under development will be derived.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: The Army did not fund this program in FY 1979 during the normal budget cycle due to higher priority requests and anticipation of Defense Nuclear Agency (DNA) funding. Consequently a congressional descriptive summary was not submitted. DNA funding did not materialize as expected, and since continuation of the FY 1978 effort was warranted, $1.999 million was restored by reprograming funds below the threshold in September 1978.

E. OTHER APPROPRIATION FUNDS: Proposals have been submitted for DNA funds for FY 1980. Support level between $2 million and $4 million are expected. However, DNA will not support test/evaluation of individual items of equipment related to US Army nor the test/evaluation of conventional threats to survivability of theater nuclear forces; the Army must fund for this R&D. Past years have also included PE 6.51.01.A and PE 6.51.02.A funding for studies in support of the TRADOC TNF/S program. TRADOC funds the TNF/S effort in PE 6.51.02.A, and the US Army Materiel Development and Readiness Command (DARCOM) supports the TRADOC TNF/S in PE 6.57.13.A.

Program Element: #6.57.08.A
DoD Mission Area: #610 - Technical Integration

Title: Theater Nuclear Force Survivability (TNF/S) Analysis
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: The Secretary of Defense decided, in August 1974, to undertake a study of the survivability of European theater nuclear forces under conventional, nuclear, and chemical attacks to identify deficiencies and develop improvements. An Office of the Secretary of Defense (OSD) steering group, in December 1974, further defined for the Army the four major areas of the study: (1) detection, (2) threat evaluation, (3) survivability assessment, and (4) countermeasures/modifications to increase survivability. The official title was changed from Theater Nuclear Forces Security Research and Development (R&D) Program to the Theater Nuclear Force Survivability Study in June 1976. In January 1977, OSD tasked the Defense Nuclear Agency (DNA) to establish a broad technological program which would allow decisions to be made on the issues surrounding the survivability and security issues of theater nuclear forces. A number of the areas being investigated by DNA were of common interest to the Army and DNA, and funding from DNA was anticipated when they were given the mission and the funds to perform the mission. When DNA funds did not materialize to the level expected the Army took action to program funds for the FY 1980 and FY 1981 program. Reprograming actions were also initiated in September 1978 to provide RDTE,A funds for FY 1979. The Army TNF/S program is supported by Army study funds; research, development, test and evaluation (RDTE) funds; and DNA funds. RDTE funds are programed for tasks which are related to RDTE. To accomplish this effort it is necessary to determine the survivability of individual pieces of equipment against a postulated threat. This effort also requires the development of analytical models to assess items of equipment. Research and development with operational equipment will validate data for analytical base. This data is then used to determine unit survivability and the total force survivability. Modifications to nuclear systems, to enhance their survivability, are investigated and computer models are used to address improvements to TNF survivability.

G. RELATED ACTIVITIES: The Army TNF/S study program relates to the DNA TNF/S program insofar as DNA addresses areas where Army considerations are involved. The DNA program is logistics oriented toward support and security of nuclear systems. Element/Mission needs in the DNA program are empirically and qualitatively derived and have limited application to development of a quantitative analytical base. DNA does not consider a threat, nor development of doctrine to enhance survivability. While DNA addressed present systems, Army program considers systems available in 1985 and beyond. In addition, Program Element 6.21.20.A, Nuclear Weapon Effects Fluidics, has provided survivability data on specific systems. DNA funds some other nuclear weapons effects work at Army laboratories which is not funded directly for this program element, but which also provides data to this program.

H. WORK PERFORMED BY: Harry Diamond Laboratories, Adelphi, MD; Ballistic Research Laboratory, Aberdeen Proving Ground, MD; US Army Electronics Research and Development Command, Fort Monmouth, NJ; US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA; US Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, MD; US Army TRADOC Systems Analysis Activity, White Sands Missile Range, NM; US Army Armament Research and Development Command, Dover, NJ; US Army Ordnance & Chemical Center and School, Aberdeen Proving Ground, MD.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: A classified handbook has been compiled which contains the vulnerability data for PERSHING, LANCE, HONEST JOHN, NIKE HERCULES, 8-inch M110 howitzer and 155mm howitzer. The vulnerability assessment and the vulnerability reduction assessment of the 8-inch M110 howitzer has been completed. A nuclear damage assessment code has been

written to meet the needs of the TNF/S study. Assessment of the survivability of the 155mm and 8-inch self-propelled howitzer batteries was also completed. The Electronic Warfare (EW) subprogram initiated a study to develop appropriate EW models for intercept, identification location, jamming, and deception.

2. FY 1979 Program: Vulnerability assessment against the conventional, nuclear, and electronic warfare threat will continue for selected nuclear systems, e.g., howitzers and command and control related equipment. Damage assessment code will be refined and expanded. C^3 models will be completed.

3. FY 1980 Planned Program: Based on the vulnerability assessments of selected nuclear systems developed during previous years, modifications to improve survivability will be investigated. Continued investigation of impact of enemy multisensor target acquisition (TA) equipment and NATO TA equipment will determine the peculiar signatures of nuclear units, and effective countermeasures. Tests with equipment will validate recommended fixes. These modifications will then be incorporated in the damage assessment computer code and a net assessment model will be created.

4. FY 1981 Planned Program: The remaining items of equipment will be analyzed for survivability modification, data will be input from all subprograms into the net assessment model, and a final net assessment will be performed. Data from field exercises will validate acquisition and vulnerability parameters. NATO Theater-to-Division command and control out to 1985 will be evaluated, and fixes recommended. Recommendations for new equipment will be made, as required. Application to non-US NATO allies will be made as far as the data base will support. A final report will be written.

5. Program to Completion: Research, development, test and evaluation (RDTE) portion of program will be completed in FY 1981 if funding profiles remain unchanged. The special study status of this program is expected to end with the FY 1981 effort. Subsequent Army study efforts in the TNF/S area will either be a part of the normal combat developments mission of the US Army Training and Doctrine Command (TRADOC) or will be funded as a part of the TRADOC Study and Analysis Program (PE 6.51.02). The analytical base developed from TNF/S will be available to evaluate/validate survivability of any new or proposed NATO or Warsaw Pact item of equipment; and the impact of its survivability on the battlefield.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.09.A
DoD Mission Area: #630 - International Cooperative R&D

Title: Exploitation of Foreign Items
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	945	1500	1500	1500	Continuing	Not Applicable
D650	Exploitation of Foreign Items	945	1500	1500	1500	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program covering acquisition and evaluation of foreign materiel in support of RDTE projects, threat analysis, and technology enhancement. The program pursues the utilization of foreign technology in support of RDTE projects and threat analysis.

C. BASIS FOR FY 1980 RDTE REQUEST:

Program Element: #6.57.09.A
DoD Mission Area: #630 - International Cooperative R&D

Title: Exploitation of Foreign Items
Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	945	1500	1500	Continuing	Not Applicable

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.09.A
DoD Mission Area: #630 - International Cooperative R&D

Title: Exploitation of Foreign Items
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Evaluation and exploitation of foreign materiel is conducted to determine the state-of-the-art of foreign technology in support of exploratory research, and advanced and engineering development. Evaluation and exploitation of threat materiel is conducted to assess the state-of-the-art of threat technology in support of long range threat analyses. The Army must be prepared to exploit or defeat foreign materiel through a thorough knowledge of their capabilities, characteristics and vulnerabilities. All evaluation efforts are based on stated requirements of Army RDTE, intelligence forecast, force development or other requirements as appropriate. Results of evaluation are published in reports and disseminated to all interested parties throughout the Department of Defense.

G. RELATED ACTIVITIES: Scientific and technical information requests from intelligence production activities, and the development of operational testing of US hardware are related to evaluation efforts under this program. Exploitation evaluation is coordinated with Defense Intelligence Agency, all Services, and other interested agencies. Program Element 6.57.14.A, Foreign Weapons Evaluation, insures that foreign Free World military materiel, which appears to satisfy US Army needs, is adequately evaluated as a viable acquisition alternative to a US development program and to enhance NATO standardization through the acquisition of NATO common materiel.

H. WORK PERFORMED BY: The actual evaluation of materiel is normally assigned to the commodity command or separate laboratory within the US Army Materiel Development and Readiness Command having developmental responsibility for counterpart US materiel. Other resources are tasked in a support role depending upon evaluation requirements and area of expertise. In the case of bi- or tri-Service evaluation, where the Army acts as the Executive Agent, the Army is responsible for implementing the evaluation to insure that the objectives and requirements of all Services and agencies are satisfied. The US Army Foreign Science and Technology Center, Charlottesville, VA, has overall management responsibility for Project D650, Exploitation of Foreign Items.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Work was directed toward the development of simulation models of selected air defense items. In the latter part of FY72, a number of actual missiles were acquired. As a result, the simulation effort was diverted to evaluate the actual hardware. Other efforts included the evaluation of items of allied equipment to determine state-of-the-art technology and potential for US purchase. Evaluated materiel included the British WG 13 helicopter, Swedish light tank track, Finnish A45 4x4 truck, the Norwegian NM 87 chronograph, a Norwegian laser rangefinder, and Japanese fiberoptic material. Materiel evaluated in FY74 included a Swiss 4x25 telescopic sight, a Canadian gun alignment system, selected items of foreign ordnance, a Canadian high energy laser power tube, foreign adhesives and plastics, explosive ordnance disposal (EOD) of foreign munitions, and selected items of individual and general equipment; and initiation of evaluation of Brazilian run flat tires.

In FY75 evaluation efforts included the Brazilian run flat tire, the Swiss Kern gun sight, and initiated evaluation of fluidic components (Italian/Belgian/French); Tampella Mortar (Finland); Rocket Release unit (France); Thin Film Display (Japan); Electroluminescent Panels (Japan); and Run Flat Tires (France). Evaluation of the Volvo truck (Sweden) was initiated. Projects initiated in FY78, included Water Pump (Israel); Detector Array (France); Amphibious Jeep (Italy); Monopole antenna (UK); electro-magnetic pulse (EMP) hardness tests of solid state devices (Japan); Typesetter (Japan); Riot Control Dispenser (Israel); Mine Detector (Japan); Thermal Countermeasures Blankets (FRG); and CBR Decontamination Unit (Sweden).

2. FY 1979 Program: Evaluation and exploitation of foreign materiel technology will continue. New evaluations include Silicon (FRG); Magnetron 5163 (UK); Sight KS-2 (Sweden); Carcinitron (France); Laser Detector (FRG); Detector Array (France), Main Rotor Blade (FRG); Starflex Hub (France); Sanator CBR Decon Unit (Norway); Thyratron 70 (UK), Thyratron 1536 (UK); Cargo Nets (France); Fiber Optics (Japan/FRG); Chloride (Japan); Fluidics (Japan); HK 36 Reflex Sight (FRG); GALIL Sight (Israel); RBS-70 Missile (Sweden), Oscilloscope (France); Laser Diode (Japan); BOFORS Fuze (Sweden); Laser (FRG); Beacon Locator (Canada); Hyperbar System (France).

3. FY 1980 Planned Program: Evaluation and exploitation of foreign materiel technology will continue. The thrust of this program is to contribute to the reduction of dollars/time devoted to the costly areas of basic research and exploratory development; demonstrate new and unique approaches to the solution of developmental problems; and furnish examples of foreign ideas/innovations for incorporation into the US technology base. The request will support evaluation of eighteen (18) items for exploitation. Targets of opportunity will be considered as the occasion arises.

4. FY 1981 Planned Program: Testing and evaluation of foreign materiel will continue. The FY 1981 program will be flexible so that as foreign materiel becomes available it will be exploited, tested, and evaluated in a timely manner. The program offers a high pay off for the resources invested.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.12.A

Title: US Army Operational Test and Evaluation Agency (OTEA) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	9001	9199	12613	10850	Continuing	Not Applicable
MN01	Operational Test and Evaluation (OTE) Support Equipment	0	0	0	350	Continuing	Not Applicable
M001	Initial Operational Test & Evaluation	9001	9199	12613	10500	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct Initial Operational Test and Evaluation (IOTE) of major and selected nonmajor materiel systems. IOTE refers to test and evaluation of the operational effectiveness and suitability of developmental materiel, conducted under conditions as close as possible to those encountered in actual field use with troops representative of those trained to employ the materiel, to assist in making important program decisions prior to commitment to production. Special mobile instrumentation and targets are developed under this program to permit conducting tests at noninstrumented sites that have advantages such as special terrain.

C. BASIS FOR FY 1980 RDTE REQUEST: Requested funds provide for conducting test and evaluation of the operational effectiveness and suitability of 15 major and selected nonmajor developmental systems, such as PATRIOT air defense missile system, new Army main battle tank and Advanced Attack Helicopter.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	7501	7200	7755	Continuing	Not Applicable

FY 1978 costs increased due to added tests being more sophisticated and expensive than tests which were removed from the FY 1978 program. Examples are an added test deemed to be necessary to support a full-scale production decision on the Tactical Fire Direction System, and an added test of the Defense Advanced Research Projects Agency High Mobility and Agility (HIMAG) vehicle to determine its capability to outmaneuver antiarmor weapons in a combat environment. The FY 1979 cost estimate increased because of program revisions (to include acceleration) and refinements of estimated test costs (to include cost growth) for XM1 tank, COPPERHEAD cannon-launched guided projectile, tactical emitter location and identification system, 81mm mortar, and armored personnel carrier. The FY 1980 estimate increased because of numerous program revisions and refinements of cost estimates, to include: DIVAD Gun, M60A3 improvements, HIMAG candidate vehicles, COPPERHEAD, Tactical Operations System, and Position Location and Reporting System. In order to obtain the data required for decisionmaking, the FY 1980 tests will be more complex than prior tests and will involve more people and support equipment. For example, remote-controlled targets are required for realistic testing of modern antitank weapons, and many player participants and airborne and ground vehicles are required for realistic testing of the Position Location and Reporting System.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.12.A

Title: US Army Operational Test and Evaluation Agency (OTEA) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program element consists of two projects. Project M001, Initial Operational Test and Evaluation (IOTE), provides funding for costs incurred by the US Army Operational Test and Evaluation Agency (OTEA) in the conduct of IOTE on major and selected nonmajor materiel systems. OTEA actively participates in the conduct of tests and provides an independent evaluation of each prospective system's military utility, operational effectiveness, and suitability directly to the appropriate decision review. Prior to FY 1976 IOTE was funded by the Operations and Maintenance Army (OMA) appropriation, Program 2 (208015). Funds were transferred from OMA to this program in accordance with decisions to fund IOTE from the RDTE appropriaton. Project MN01, OT&E Support Equipment, provides funds for development of special mobile instrumentation and targets to support IOTE of systems at locations where instrumented ranges do not exist. This permits taking advantage of sites with special test terrain and operational environment, thus providing a more realistic test, and avoiding potential test delays at heavily scheduled permament sites.

G. RELATED ACTIVITIES: Close and continuous coordination exists between OTEA, and development test activites, materiel developing agencies, and the US Army Training and Doctrine Command (TRADOC) agencies. This coordination ensures optimum effectiveness of Army testing activities, and avoids duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering (Test and Evaluation) reviews planned testing and development of support equipment to ensure integration of testing by the Services and to avoid duplication of instrumentation developments. Full time liaison personnel are assigned by each of the Services to appropriate test activity headquarters of the other Services. OTEA supervises the Army's Five Year Test Program which includes IOTE and Force Development Testing and Experimentation (FDTE) programs. IOTE of most nonmajor developmental materiel items are conducted by TRADOC with funding provided under project DV03 in Program Element 6.57.07.A, TRADOC Operational Testing. The fixed and recurring costs incurred in connection with IOTE by the TRADOC Test Boards are financed by project DV02, in Program Element 6.57.07.A. When the test boards or other test agencies support OTEA in the conduct of IOTE, direct test costs are reimbursed by OTEA with project M001 (IOTE) funds.

H. WORK PERFORMED BY: Primarily the work is performed by in-house personnel (civilian and military) assigned to OTEA and by personnel (civilian and military) assigned to the various Army installations where tests are conducted. By definition, operational tests only use regular Army troops as players and no contractor personnel or development technicians are used.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: RDTE funding was initiated in FY 1976. The 19 tests performed in FY 1975 and prior years were funded by the Operations and Maintenance Army appropriation in accordance with Department of Defense funding practice at that time. In FY 1978 and prior years, operational tests have been conducted on such systems as the new Army main battle tank, lightweight company mortar system, mechanized infantry combat vehicle, BLACK HAWK utility tactical transport aircraft system, advanced attack helicopter, artillery locating radar, air defense command and control system, and COPPERHEAD cannon-launched guided projectile.

Program Element: #6.57.12.A

Title: US Army Operational Test and Evaluation Agency (OTEA) Operational Testing

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: US Army Operational Test and Evaluation Agency (OTEA) will direct and participate in 16 operational tests of such systems as COPPERHEAD cannon-launched guided projectile, PATRIOT air defense missile system, new Army main battle tank, HELLFIRE heliborne fire and forget missile system, VIPER light antitank/assault weapon, NAVSTAR global positioning system, infantry fighting vehicle system, defense satellite communications system, and tactical emitter location and identification system.

3. FY 1980 Planned Program: OTEA will participate in 15 operational tests of such systems as the advanced attack helicopter, tactical operations system, new Army main battle tank, command nodal communications equipment, general support rocket system, position location reporting system, mortar locating radar, and division air defense gun.

4. FY 1981 Planned Program: OTEA will direct and participate in 13 operational tests on systems such as the squad automatic weapon, single channel ground and airborne radio system, stand-off target acquisiiton system, close combat antiarmor weapon system, STINGER manportable air defense system, and 120mm gun for the new main battle tank. Work will begin to overcome inadequacies recognized in the instrumentation inventory to enable more efficient collection of data on the more sophisticated systems under development.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.01.A
DOD Mission Area: #641 - Other Management Support

Title: Programwide Activities
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	41699	43304	52210	66362	Continuing	Not Applicable
MM88-01	Command Headquarters Support	27802	35380	43424	43860	Continuing	Not Applicable
MM88-02	General Administrative Activities	4802	2023	2425	2525	Continuing	Not Applicable
MM88-03	Special Purpose and Automatic Data Processing (ADP) Equipment	8416	5546	4831	19237	Continuing	Not Applicable
MM88-04	Minor Construction	679	355	630	740	Continuing	Not Applicable
MM88-05	Defense Systems Management College	0	0	900	0	Not Applicable	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program funds efforts directed toward support of Army RDTE installations, activities, and/or operations required to accomplish overall assigned general research and development missions (and which cannot be allocated to specific R&D projects). This is a continuing program which includes logistical and facility support to Army Management Headquarters Activities (AMHA) as established by Department of Defense Directive 5100.73 and Army RDTE programs at field command level; for operating costs of those RDTE headquarters type activities not classified as AMHA; and, support to R&D laboratories and research facilities for equipment items and minor construction projects which cannot be identified to a specific R&D project. Requested resources finance salaries and related costs for civilian personnel assigned to non-AMHA RDTE headquarters type activities and performing logistical type support at non-AMHA headquarters; base operations/facility support to AMHA headquarters; purchase of special purpose and automatic data processing (ADP) equipment items which support two or more R&D projects and for RDTE-funded Occupational Safety and Health Act (OSHA) and Environmental Protection Agency (EPA) minor construction requirements.

C. BASIS FOR FY 1980 RDTE REQUEST: Requested program supports continuing requirements including those additional costs resulting from realignment of the US Army Materiel Development and Readiness Command (DARCOM) activities in accordance with the Army Materiel Acquisition Review Committee (AMARC) recommendations. The AMARC implementation, which realigned DARCOM major subordinate headquarters into separate R&D and Readiness Commands, resulted in funding responsibility transfers from Operations and Maintenance, Army (OMA) to RDTE,A appropriation and within the RDTE,A appropriation program elements. These transfers support facilities operation and maintenance and other base operation support activities at R&D command headquarters locations which were previously

supported by Operations and Maintenance, Army (OMA) or prorated to R&D projects. Army Materiel Acquisition Review Committee (AMARC) implementation actions will be completed during FY 1979, with FY 1980 representing the first full year of operation under the AMARC realignment. Increased programing reflected for this activity does not result in increased personnel or funds for the overall Army appropriation. Rather, it reflects an improved method of programing, operating, and reporting the Army's RDTE efforts.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	44942	46380	66931	Continuing	Not Applicable

FY 1978 and FY 1979 decreases are due to the transfer of funding responsibility for the Army Research Office (ARO) to program element 6.11.02 (Defense Research Sciences) and for the Air Mobility Research Laboratory to program element 6.22.09 (Aeronautical Technology). In addition to this change, the FY 1980 decrease also reflects transfer of Indicia Mail Service to the Operations and Maintenance, Army (OMA) appropriation ($0.6M) and reduced support for special purpose and automatic data processing equipment based on prioritization within the overall RDTE,A budget level.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #641 - Other Management Support Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program includes four general categories: (1) Operation of those Research, Development, Test, and Evaluation Commands not designated as Army Management Headquarters Activities (AMHA); (2) Logistical support activities at or associated with Research, Development, Test, and Evaluation Commands to include reimbursement to other appropriations or activities for operation and maintenance of facilities and real property occupied by R&D commands; (3) Procurement of special purpose equipment, and automatic data processing equipment; and (4) Minor construction projects ($100K ceiling) which are not identifiable to single R&D projects. Category (1) supports US Army Medical and Chief of Engineers R&D administration, and operation of the US Army Test and Evaluation Command, Mobility Equipment R&D Command, and Natick R&D Command; Category (2) includes logistical support at the US Army Materiel Development and Readiness Command (DARCOM) and subordinate R&D Command headquarters; support of Standardization Groups in Australia, Canada, and the United Kingdom; and reimbursements in support of utilities and maintenance provided to DARCOM by other appropriations or activities. Category (3) includes procurement and/or leasing of equipment. Category (4) provides payment for construction contracts required by laboratories in support of R&D efforts supporting more than one project.

G. RELATED ACTIVITIES: Command headquarters perform staff management functions related to work performed by RDTE laboratories and test facilities.

H. WORK PERFORMED BY: Subordinate commands and other activities of the US Army Materiel Development and Readiness Command (DARCOM), the US Army Medical Research and Development Command, and the Office, Chief of Engineers Research and Development Headquarters Activity.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Provided funds for operation of US Army Test and Evaluation Command, USA Medical R&D Command, Chief of Engineers R&D Headquarters Activity, and Standardization Groups (in Canada, Australia, and United Kingdom). Supported logistical activities associated with operation of all R&D Commands to include reimbursement for base operations (facility) when RDTE headquarters are a tenant activity of another service or appropriation. Overall responsibility for this support becomes an RDTE-funded function upon establishment of separate R&D commands in accordance with the Army Materiel Acquisition Review Committee (AMARC) recommendations. Funds were also provided for procurement of special purpose and automatic data processing equipment needed by RDTE laboratories for support of overall R&D projects (items not identifiable to specific projects). Minor construction projects (less than $100,000) associated with equipment installation, Environmental Protection Agency (EPA), and Occupational Safety and Health Act (OSHA) requirements were also supported within this program.

2. FY 1979 Program: Continue support of activities outlined in above paragraph (to include base operations/facility support for R&D Commands). Also includes costs for operation of the Mobility Equipment R&D Command and Natick R&D Commands (these two Commands were established as a part of the AMARC realignment).

Program Element: #6.58.01.A
DOD Mission Area: #641 - Other Management Support

Title: Programwide Activities
Budget Activity: #6 - Defensewide Mission Support

3. FY 1980 Planned Program: Continue support of activities outlined in above paragraphs. Increased requirements for FY 1980 represent the first full year of managing the Army's RDTE efforts as envisioned by the Army Materiel Acquisition Review Committee (AMARC) recommendations. The FY 1980 program includes annual support for approved civilian personnel authorizations and related costs at R&D commands not designated as Army Management Headquarters Activities (AMHA), logistical support and base operations/facility support for all R&D Commands, and minimum annual equipment and minor construction costs. FY 1980 program also includes funds for Office, Secretary of Defense directed acquisition management research and special studies to be conducted by the Defense System Management College.

4. FY 1981 Planned Program: Continue support of RDTE activities outlined above plus additional equipment required to maintain state-of-the art capabilities at all R&D laboratories.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: Resources programed in this project are required to fund logistic and non-AMHA (Army Management Headquarters Activities) operation of or direct support to Research, Development, Test, and Evaluation commands. These functions include both facility and administrative base operations support reimbursed to other agencies by R&D commands and support of RDTE headquarters civilian personnel not identified as AMHA (Program Element (PE) 6.58.98). These personnel perform operational and management type functions at non-AMHA RDTE commands, and base operations/logistic support type functions at all RDTE commands, (e.g., data processing, security, legal, safety, clerical, and finance and accounting). The Army Materiel Acquisition Review Committee (AMARC) realignment of US Army Materiel Development and Readiness Command (DARCOM) subordinate headquarters into separate R&D and readiness commands required a shift of funding between the Operation and Maintenance, Army and the RDTE appropriations and between RDTE,A program elements. These funding transfers have been accommodated within overall Army funding availability.

B. RELATED ACTIVITIES: Logistical functions funded in this project are in direct support of RDTE Army Management Headquarters Activities (see Program Element 6.58.98.A, Management Headquarters (R&D)). Headquarters funded in this project perform staff management functions for work performed by RDTE laboratories and test facilities.

C. WORK PERFORMED BY: Activities assigned to DARCOM Command Headquarters, DARCOM subordinate RDTE commands, US Army Medical R&D Headquarters, and Chief of Engineers R&D Headquarters activity.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Provided support for logistical functions associated with DARCOM Command Headquarters and subordinate R&D commands, and operation of and logistical support to US Army Test and Evaluation Command, Chief of Engineers R&D Headquarters Activity and US Army Medical R&D Headquarters.

2. FY 1979 Program: Continue headquarters and support functions outlined above. The FY 1979 program includes annual costs for operation of US Army DARCOM Test and Evaluation Command, Natick R&D Command, Mobility Equipment R&D Command, US Army Medical R&D Command, and Chief of Engineers R&D Headquarters activity. This includes salaries and benefits for authorized civilian personnel and related operating costs (e.g., travel, supplies and equipment). This program also includes annual logistic/base operations support costs for these headquarters, for the Armament R&D Command (ARRADCOM), Aviation R&D Command (AVRADCOM), Missile R&D Command (MIRADCOM), and Tank Automotive R&D Command (TARADCOM); and partial annual support for Communications R&D Command (CORADCOM) and Electronics R&D Command (ERADCOM) which were recently established by the AMARC realignment of DARCOM subordinate commands. (The AMARC functionally organized DARCOM commodity commands into separate Readiness and R&D commands on a phased basis.)

Project: #MM88-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support Budget Activity: #6 - Defensewide Mission Support

3. FY 1980 Planned Program: Resources have been programed for annual costs for operation of and logistical support to RDTE commands which are not designated as Army Management Headquarters Activities (AMHA) listed in above paragraph and for annual logistic/base operations support costs for support of the six US Army Materiel Development and Readiness Command (DARCOM) R&D Commands. Programed FY 1980 resources support (1) operation of all non-AMHA headquarters established by the Army Materiel Acquisition Review Committee (AMARC) realignment and (2) logistic and base operations functions in direct support of all RDTE commands.

4. FY 1981 Planned Program: Continued support of RDTE activities outlined above.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	27802	35380	43424	43860	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	27339	33851	34668	-	Continuing	Not Applicable

Minor increase for FY 1978 is associated with personnel turbulence (mission and functions transfers, reassignments, and relocations) resulting from Army Materiel Acquisition Review Committee (AMARC) realignments. Difference for FY 1979 results from increase for civilian payraises offset by realignment of personnel between this program element (PE) and PE 6.58.98 (Army Management Headquarters Activities) and based on finalization of AMARC realignments. Increase for FY 1980 represents additional costs for support of the Communications R&D Command (CORADCOM), the Electronic R&D Command (ERADCOM), and Mobility Equipment R&D Command (MERADCOM). The CORADCOM and ERADCOM realignments were not yet initiated at the time of the FY 1979 submission. Validation of support personnel requirements and associated base operations/facility support requirements resulted in increased requirements for these commands. Additionally, realignment changes for MERADCOM were not fully implemented at the time of the FY 1979 submission and these changes are also reflected in the current FY 1980 request. FY 1980 programing reflects the first full year of operation under the AMARC realignment (as evidenced by the funding level programed for FY 1981).

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-03
Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Special Purpose and Automatic Data Processing Equipment
Title: Programwide Activities
Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: This program finances the procurement, installation, and maintenance of scientific, technical, and other laboratory equipment unique to Research and Development missions and not identified to a single RDTE project. Included in this program is the acquisition of Automatic Data Processing (ADP) and Special Purpose Equipment including replacement or modification of equipment required to maintain and perpetuate "state-of-the-art" capabilities in RDTE scientific laboratories. Prior to programing, the requirements for new equipment are evaluated against such considerations as: (1) adequacy of existing equipment; (2) cost of modernization vs replacement; (3) availability of other laboratories inventory; and, (4) essentiality of equipment to mission. Foreign "state-of-the-art" capabilities and potential threats to present and future materiel or systems are also considered. This program is the only source for acquisition of multi-purpose scientific and technical RDTE laboratory equipment which supports more than one R&D project.

B. RELATED ACTIVITIES: Not Applicable.

C. WORK PERFORMED BY: RDTE Army laboratories and facilities of the US Army Materiel Development and Readiness Command, US Army Medical Research and Development Command, and Office, Chief of Engineers.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Provided funding for special purpose and automatic data processing (ADP) equipment as outlined in paragraph A above. FY 1978 funds basically supported only fixed contract type costs (to include on-going equipment maintenance and rentals, plus final increment of the ADP installation at Ballistic Research Laboratory) and emergency type equipment replacements.

2. FY 1979 Program: Continue support for essential fixed type costs and emergency replacement of special purpose and automatic data processing equipment required for continuance of current level of day-to-day laboratory support to R&D projects.

3. FY 1980 Planned Program: Continue support for essential fixed type costs and emergency replacement of obsolete and/or inoperable equipment items at numerous Research and Development laboratories. Programed purchases include numerous low-dollar value laboratory and scientific equipment items such as microscopes, power units, honing machines, presses, sensors, amplifiers, photo instrumentation, diagnostic equipment items, testing and measurement instruments, oscilloscopes, simulators, analyzers, chromatographs, colorimeters, etc.

Project: #MM88-03
Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Special Purpose and Automatic Data Processing Equipment
Title: Programwide Activities
Budget Activity: #6 - Defensewide Mission Support

4. FY 1981 Planned Program: Continue FY 1980 level of support plus purchase of new equipment items to restore "state-of-the-art" capabilities at all R&D laboratory facilities. This includes upgrading tactical digital computers at the Missile Systems Tactical Software Center and the U1106 Computer System at Natick Laboratory. Programing also supports minor amounts for increasing ADPE capabilities at Harry Diamond Laboratory, Ballistics Research Laboratory and Mobility Equipment Research facilities as required to maintain current state-of-the-art capabilities in these facilities.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirement)	8416	5546	4831	19237	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	8458	6571	23389	-	Continuing	Not Applicable

FY 1978 change is insignificant. FY 1979 change is due to reprograming among projects within the overall program element as required to support assigned personnel and related costs. Reduction for FY 1980 results from Department of Army and Secretary of Defense prioritization of programs within available RDTE,A budget level.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.02.A
DoD Mission Area: #630 - International Cooperative R&D

Title: International Cooperative Research and Development
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	581	600	600	600	Continuing	Not Applicable
M798	International Cooperative Research and Development	581	600	600	600	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Encompasses exchange of research and development (R&D) technology with selected allies to reduce the incidence of duplicative efforts and costs. Media of exchange include data exchange agreements and multinational forums, e.g., North Atlantic Treaty Organization (NATO) and American, British, Canadian, and Australian (ABCA) Standardization Program.

C. BASIS FOR FY 1980 RDTE REQUEST: This program supports travel, US share of costs of the NATO Industrial Advisory Group (NIAG) and other minor costs associated with international exchange of technology to include negotiation of cooperative research and development projects. US portion of shared cost of cooperative projects is borne by applicable Research, Development, Test, and Evaluation (RDTE) program elements.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE Funds (as shown in FY 1979 submission)	600	600	600	Continuing	Not Applicable

Difference in FY 1978 funding is due to actual costs bring less than anticipated.

E. OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: #6.58.02.A
DoD Mission Area: #630 - International Cooperative R&D

Title: International Cooperative Research and Development
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Program encompasses the exchange of research and development technology with selected allies in order to reduce the incidence of duplicative efforts, thereby lowering costs. Through these exchanges, cooperative research and development projects are identified, negotiated, and pursued. Cooperative projects reduce costs to each participant and promote standardization and interoperatibility of equipment. Exchange of technology and negotiation of cooperative projects occur through bilateral data exchange agreements and multinational forums such as the North Atlantic Treaty Organization (NATO) and the American, British, Canadian, and Australian (ABCA) Standardization Program. This program also provides the US share for NATO Industrial Advisory Group (NIAG) travel and other costs associated with their exploration of potential cooperative projects. US portion of shared costs of cooperative ventures is charged to applicable Research, Development, Test, and Evaluation (RDTE) program elements.

G. RELATED ACTIVITIES: This activity is related to all Army research and development programs, in that part of the analysis leading to a development decision is investigation and evaluation of all comparable NATO systems. This program provides the base data which identifies NATO equipments which should be evaluated. To preclude duplication of exchange of information programs between the three Services, interservice coordination is carried out for each new program. Many such exchange programs become tri-Service or bi-Service thus enhancing standardization and assuring maximum dissemination of technology.

H. WORK PERFORMED BY: In-house by US Army Materiel Development and Readiness Command, Corps of Engineers, the Surgeon General and the Army Training and Doctrine Command. International meetings and forums are attended by Army military and civilian personnel from those agencies having research and development responsibilities in a given discipline.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Information exchanges under this program have resulted in the testing of the UK L16A1 mortar for possible Army procurement; a Memorandum of Understanding with Germany regarding component standardization between the US XM1, and the German Leopard II tanks; US participation in a North Atlantic Treaty Organization (NATO) test to determine a second standard small arms cartridge and a possible new standard rifle for NATO; negotiated agreements with Germany, France, and Great Britain for tests of their air defense systems which resulted in the ROLAND program; established multinational requirements for a future family of gap crossing equipment; and coordinated US Army participation in NATO research and development activities.

2. FY 1979 Program: US participation in NATO will emphasize.the need for standardization and interoperability of defense equipment; bilaterally the US will work with Great Britain on Cannon Launched Guided Weapons and Advanced Armored Vehicle technology; with Germany, France, and Great Britain on rocket artillery support systems and antitank guided weapons systems. As opportunities are surfaced, the US will negotiate cooperative agreements with other allied nations. Additionally, structured information exchange programs will continue on a bilateral and multilateral basis.

3. FY 1980 Planned Program: Programs started in FY 1979 will continue. As identified through information exchanges, new cooperative programs will be undertaken. Increased Congressional interest and emphasis on North Atlantic Treaty Organization (NATO) Rationalization, Standardization, and Interoperability (RSI) has accelerated US efforts to identify and capitalize on cooperative opportunities. This activity, coupled with the growth in cost of travel and temporary duty, may require an increased funding level.

4. FY 1981 Planned Program: Participation in established bilateral and multilateral forums will continue consistent with US policy. The need for increased NATO standardization and interoperability of defense equipment will be stressed. It is anticipated that as the North Atlantic Treaty Council defines a specific plan of NATO standardization and interoperability that cooperative development programs will increase the importance of this program.

5. Program to Completion: As Department of Defense, Congressional, and NATO policies on NATO standardization develop, this program will be reoriented to assure compliance with such policies. It is expected that a growing awareness and concern for increased combat efficiency in NATO will create a requirement for increased US involvement with commensurate greater costs.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.03.A
DoD Mission Area: #610 - Technical Integration

Title: Technical Information Activities
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3408	3559	4890	4899	Continuing	Not Applicable
MY11	Modernized Army Research & Development Information System (MARDIS) Support	314	469	500	500	Continuing	Not Applicable
MY29	Integrated Software	290	290	260	260	Continuing	Not Applicable
M367	Automated Engineering Document Preparation System	550	400	0	0	0	4647
M720	Technical Information Functional Activities	706	600	800	800	Continuing	Not Applicable
M728	Information Technology	447	490	1549	1549	Continuing	Not Applicable
M729	Symposia-Conferences	417	400	450	450	Continuing	Not Applicable
M761	Technical Information Analysis Centers	635	760	1131	1090	Continuing	Not Applicable
M903	Signals Intelligence/ Electronic Warfare Technical Information	49	150	200	250	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Includes research, development, test, and engineering in the computer, information, communications, and library sciences as they relate to information technology. Planning, execution, and efficiency of Army Research and Development (R&D) programs benefit through these organized efforts to continually improve accuracy, availability, and accessibility of scientific, technical, and management information. Advances in these sciences are exploited to enable significant improvement in information exchange.

C. BASIS FOR FY 1980 RDTE REQUEST: Integrate Army-wide R&D efforts in computer software development to maximize exchange and minimize duplication. Support an automated R&D management information system and efforts to improve this system. Support integration and coordination of Defense Documentation Center input information on all Army RDTE. Support nationwide Conference and Symposia Program to include youth science activities to stimulate sensitivity and interest in science for the Army. Provides

limited support to seven specialized technical information analysis centers and for the Government/Industry Data Exchange Program (GIDEP). Continue to develop specialized thesaurus of unique Army interest. Support digital processing of analog information such as drawings, x-rays, and pictures in order to conserve computer memory space. Continue to improve information transfer processes and preclude unncessary expenditure of research and development (R&D) funds by making maximum use of existing knowledge.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE					
Funds (as shown in FY 1979 submission)	3426	4559	5600	Continuing	Not Applicable

The FY 1979 decrease results from a Congressional reduction. The decrease in the current FY 1980 estimate compared to last year's FY 1980 estimate is due primarily to anticipation that the Automated Engineering Document Preparation System will be ready to move out of R&D and become operational by the end of FY 1979. The estimated increase of funds for FY 1980 over funds for FY 1979 is essential to permit: development of computer systems for direct access to and exchange of technical information at Army laboratories and Technical Information Analysis Centers; and expansion of minority youth participation in Army-sponsored youth science programs.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.03.A
DoD Mission Area: #610 - Technical Integration

Title: Technical Information Activities
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Objective is to improve scientific, technical, and related management information activities required for the support of the Army RDTE Program, to include the derivation, acquisition, analysis, interpretation, storage, retrieval, processing, forwarding, dissemination, primary and secondary publishing, and use of all classes of technical and RDTE-related management information needed by Army scientists, engineers, research and development (R&D) managers, the medical department, and other technical professional personnel. Another objective is to improve the relevance, accuracy, timeliness, and accessibility of technical information flowing to and from the Army. This involves automatic data processing, microforms, graphic and analog information forms, information store and forward techniques, continuing information access, economics of information stores, data banks, and networks.

G. RELATED ACTIVITES: The Army participates in inputs and outputs of the Defense Documentation Center and Federal Information Managers Forums, and maintains liaison with the National Commission on Libraries and Information Science. Regular liaison with all Department of Defense (DOD) and other government technical information representatives is maintained to assure that no duplication of effort exists and that maximum transfer of information occurs.

H. WORK PERFORMED BY: Planning Research Corporation, Huntsville, AL (monitored by MIRADCOM (US Army Missile Research and Development Command)); Applied Data Research Incorporated, Vienna, VA (monitored by US Army Materiel Development and Readiness Command (DARCOM)); Tracor Jitco, Rockville, MD (monitored by US Army Armament Research and Development Command (ARRADCOM)); Colorado Video, Boulder, CO (monitored by the Corps of Engineers); Academy of Applied Sciences, Inc., Boston, MA; and forty-two university-level education institutions (monitored by the Army Research Office).

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: The following efforts were conducted: new remote terminals for timely processing of information required for RDTE were installed to improve program management; software research to develop improved techniques for multicommand data systems, including system simulation and modeling, computer system evaluation, interactive programing, and regional data processing; automated engineering document preparation and data handling systems; improvements were achieved in automated chemical information; Conference and Symposia Programs for information exchange and Junior Science and Humanities Symposia and Science Fair Programs; remote computer terminals were installed to provide direct access to Defense Documentation Center; automated procedures were introduced for technical information analysis centers; automated inter-library reference systems were introduced in technical libraries; and development of computer-aided selection of materials. Seven technical information analysis centers were established under Department of Defense (DOD) charter. Began cooperative effort with Department of Commerce to remotely access and share technical information between widely separated libraries by techniques of slow scan television, telemetry, and cathode-ray-tube display. Began effort to develop technique to remotely provide medical diagnostic information by converting analog data (e.g., x-rays) into digital data and forwarding over communications lines.

2. FY 1979 Program: Continue to improve the Army scientific and technical information (STINFO) program, integrating individual task efforts (e.g., converting dialogue and graphic information into digital format) into total program needs. Implement completed stages of such tasks as: development of a data base for automated preparation of documentation for procurement of nonstandard parts, chemical information system, and selective dissemination of information. Continue coordination of RDTE in computer software and centralization of computer program information; conference and symposia program for technical information exchange and support for youth science information activities; support for the Government/Industry Data Exchange Program; development of specialized bibliographies and glossaries and of techniques for computer handling of materials information; providing timely, accurate, computer-generated data for RDTE program management; efforts to automate information access to technical information centers; operational support for Army Technical Information Analysis Centers and trial operation of proposed centers; and development of technical information for the specialized needs of the Army intelligence community. Continue operation and maintenance of the Modernized Army Research and Development Information System (MARDIS).

3. FY 1980 Planned Program: Resource information for all levels of Research and Development (R&D) management will continue to be improved by automation. MARDIS will provide improved support of budget formulation, scheduling, and apportionment processes in RDTE through processing, performance, and milestones data. R&D will be completed on a practical system for the digital storage of drawings. Technical exchange activities in projects M728 (Information Technology), M729 (Symposia Conferences), M761 (Technical Information Analysis Centers), and M903 (Signals Intelligence/Electronic Warfare Technical Information) will be expanded. These will include additional technical information analysis centers, improving information access to signal intelligence information, and efforts to more closely integrate the management of Scientific and Technical Information (STINFO) through development of an Army-wide Technical Information Management Plan.

4. FY 1981 Planned Program: Ongoing efforts will be continued. Emphasis will be directed to tasks which logically follow tasks previously completed (e.g., library exchange of information via computers and satellites; the integration of R&D programs designed to make computer software cheaper, faster to develop, and more reliable and responsive). Implementation of the Technical Information Management Plan will begin.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.04.A

Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	158388	169808	182141	192187	Continuing	Not Applicable
DE90	Yuma Proving Ground	15454	15374	18441	19999	Continuing	Not Applicable
DE91	Aberdeen Proving Ground	18462	21458	23450	23118	Continuing	Not Applicable
DE92	Dugway Proving Ground	11940	12190	12640	14933	Continuing	Not Applicable
DE93	White Sands Missile Range	97930	105270	109753	114916	Continuing	Not Applicable
DE94	Army Electronic Proving Ground	8527	9033	10533	11430	Continuing	Not Applicable
DE95	Cold Regions Test Center	3696	3958	4391	4780	Continuing	Not Applicable
DE96	Tropic Test Center	2379	2525	2933	3011	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to maintain a capability for development testing (DT) of materiel systems at seven major US Army Test and Evaluation Command (TECOM) activities. These activities represent the lifeblood of an efficient Army research and development program. Each of the seven test activities has established capabilities uniquely required to assure technical adequacy and quality of particular types of materiel under development or procurement, such as missiles or chemical warfare equipment. Another objective of this program is to preclude proliferation of specialized testing facilities to meet individual program test and evaluation requirements. This program provides for the recurring installation operating costs and for all costs of conducting tests not identifiable with a particular weapon system project, to include modernization of instrumentation to insure that test capabilities are commensurate with the state-of-the-art systems to be tested.

C. BASIS FOR FY 1980 RDTE REQUEST: Each facility will plan, conduct, and support DT, engineering tests, check tests and initial production tests. The types of materiel to be tested are aircraft armament systems, tube artillery, artillery munitions, vehicles, chemical warfare and biological defense, missiles, communications equipment, high energy lasers and signal intelligence/electronic warfare equipment. The support provided will include improvement and modernization of instrumentation to provide a test capability compatible with new weapons technology, to shorten test time and reduce cost through automation, and to replace uneconomical to repair equipment.

Program Element: #6.58.04.A

Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	159935	166008	185141	Continuing	Not Applicable

FY 1978 funding was decreased slightly as a result of transfer of funds to high priority major RDTE programs. The current FY 1979 estimate is increased compared to last year's estimate to provide for restoration of damage caused by August 1978 flash flooding at White Sands Missile Range. The current FY 1980 estimate is reduced compared to last year's FY 1980 estimate due to high priority requirements in other programs.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
Military Construction, Army						
Funds (current requirements)	490	216	15598	13320	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	34315	208	12935	--	Continuing	Not Applicable

FY 1978 difference reflects transfer of High Energy Laser System Test Facility construction project from MCA to Title IV (Construction of Defense Agencies Facilities). FY 1980 change is due to addition of a construction project for signal intelligence/electronic warfare testing at Army Electronic Proving Ground.

Program Element: #6.58.04.A

Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: This program consists of seven separate projects, each of which provides funding for a major development testing (DT) activity operated by the US Army Test and Evaluation Command (TECOM), a subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). DT is conducted to support decisionmaking related to materiel acquisition programs by demonstrating that design risks have been minimized, that the engineering development process is complete, and that the system will meet its specifications. DT includes measurement of technical performance, safety, reliability and maintainability characteristics, which can only be accomplished with instrumentation commensurate with the capabilities of the materiel to be tested. DT also includes determining that natural environmental performance requirements have been met. The seven projects provide funding to four proving grounds, White Sands Missile Range (WSMR), and the Cold Regions and Tropic Test Centers for three broad task areas: improvement and modernization of test capabilities, base operations, and other costs in support of testing not directly attributable to an individual test. The four proving grounds and White Sands Missile Range now operate under a uniform Department of Defense funding policy that requires each facility to pay for the indirect costs of testing and that requires users of these facilities to pay for direct costs of testing. At the two test centers, the program finances all costs of testing and of operating and maintaining the centers. Prior to July 1976, the Cold Regions Test Center (CRTC) was known as the Arctic Test Center. The Tropic Test Center, Ft. Clayton, Canal Zone, is the only humid tropic environmental test facility of the Department of Defense (DoD). TECOM has a third natural environmental test facility located on Yuma Proving Ground, that conducts desert environmental tests. If specifically designed for an extreme environment, developmental items/systems are normally tested first under temperate zone conditions and then in environmental chambers located within the continental United States.

G. RELATED ACTIVITIES: These seven test facilities plus 19 other Army, Navy and Air Force test facilities make up the DoD Major Range and Test Facility Base. Two other Army facilities are included in these 19: Kwajalein Missile Range, financed by P.E. 6.53.01.A and Jefferson Proving Ground, which is not financed by the RDTE appropriation. This program, with its emphasis on testing, is related to the activities of other Army test facilities, commodity commands, and other military service facilities, as well as the US Army Operational Test and Evaluation Agency. Liaison personnel are assigned to assure that appropriate coordination takes place with these closely related activities. Further, the Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all DoD test facilities and planned testing activities to avoid unnecessary duplication of capabilities, to insure that highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services.

H. WORK PERFORMED BY: The work is primarily performed by in-house personnel (civilian and military) assigned to TECOM. Approximately 28 million dollars of contractor effort was expended in FY 1978. Contractors included: Hawthorne Aviation, Charleston, SC; Don Brown Associates, Melbourne, FL; Bell Aerospace Company, Tucson, AZ; Dynalectron, Albuquerque, NM; RCA, Moorestown, NJ; Physical Sciences Laboratory, New Mexico University, Las Cruces, NM; International Sensor Systems, Aurora, NE;

IBM, Owego, NY; Lockhead Engineering Services Division, Houston, TX; and Vega Enterprises, El Paso, TX. Other government agencies that are involved include: US Army Research Office, Durham, NC; US Army Corps of Engineers, Albuqueque, NM; Lexington Army Depot, Lexington KY; US Air Force Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM: National Bureau of Standards, Washington, D.C., Vavajo Army Depot, Flagstaff, AZ; and US Forces Command, Ft. McPherson, GA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. FY 1978 and Prior Accomplishments: Testing was carried out to support decisionmaking on important Army developmental systems. Examples are: Mechanized Infantry Combat Vehicle; XM1 Tank; Improved HAWK, PATRIOT, ROLAND, LANCE, STINGER and PERSHING Missile Systems; BLACKHAWK helicopter; CH-47 helicopter modernization; attack helicopters; CHAPARRAL air defense gun; 105mm, 155mm and 8" howitzers; Mortar Locating Radar; Tactical Satellite Communications; Tactical Landing System; tactical fire direction system; biological protection equipment and shelters; chemical binary projectiles; smoke projectiles; and incendiary rockets. Testing was also carried out in support of joint service tests of equipment such as Tactical Wideband Secure Equipment; and in support of other government agencies, such as: Remotely Piloted Vehicles (Air Force), Insecticide Spray System (Forest Service), migration of hazardous substances through soil (Environmental Protection Agency) and TOMAHAWK Cruise Missile (Navy). Maintenance and repair of test facilities fell drastically behind due to austere funding levels in early years and the urgent need to modernize the facilities to keep pace with technology of the systems to be tested; only critical repairs dictated by safety or legal requirements could be accomplished creating a huge backlog of long overdue essential maintenance and repair of facilities. The Army is intensively investigating this situation with the aim of reversing, or at least halting the growth of this backlog. A modest amount of instrumentation was procured and examples are noted in individual Congressional Descriptive Summaries for each proving ground or range. A standard range timing system was procured for Cold Regions Test Center to correlate event and computer data during testing. The system is expandable as requirements dictate. Photographic, chemical-petroleum, and human factors laboratory equipment and instrumentation; mobile instrumentation van improvements; and field range sensors and equipment were procured for Tropic Test Center.

2. FY 1979 Planned Program: In order to continue the modest instrumentation modernization made possible in FY 1978, to provide instrumentation for a new high energy laser system test facility at White Sands Missile Range and for the testing of tactical signal intelligence/electronic warfare equipment at Army Electronic Proving Ground, and to provide for cost growth, the backlog of essential maintenance and repair of facilities has been permitted to increase. Civilian test manpower has been reduced each year. US Army Test and Evaluation Command (TECOM) now has 1/2 the number of civilian personnel that it had in 1962 when it was established; however, test workload has increased because the increased complexity of items being tested requires more data to provide acceptable risks. This increase has been accomplished through improved efficiency and increased productivity, but the yield in these areas each year is limited. Developmental systems and equipment being tested and planned instrumentation improvement and modernization procurements are noted in the RDTE Congressional Descriptive Summaries for each proving ground or range.

Natural cold weather and humid tropic climate tests are being conducted on equipment such as COPPERHEAD (Cannon Launched Guided Projectile), STINGER (Shoulder-fired air defense missile), TACFIRE (Tactical fire direction system), TOW and DRAGON (Antitank Assault Weapons), Mortar Locating Radar, Ultra High Frequency Satellite Communications Ground Terminal, Hand-Held Laser Rangefinder, 105mm Howitzer, Platoon Early Warning System, Surface Launched Unit Fuel-Air Explosive, Swedish Small Unit Support Vehicle, Family of Military Engineer Construction Equipment, Ground Emplaced Mine Scattering System, Chemical Agent Detector Kit, Lightweight Company Mortar System, Gas Turbine-Driven Generator Set, Personnel Armor System, Reverse Osmosis Water Purification Unit, Collapsible Fabric POL Tank, Squad Automatic Weapon, Tactical CS Rocket, and Smoke Warhead Rocket. Cold Regions Test Center (CRTC) will improve its vehicle testing capability through procurement of self-contained on-board recording packages, telemetry equipment, vehicle exhaust analyzer, and velocity, acceleration, shock and vibration measuring equipment. Tropic Test Center will be improving and modernizing capabilities for ballistic performance measurement. $3.8 million has been reprogramed into this PE to provide for restoration of damage caused by August 1978 flash flooding at White Sands Missile Range.

3. FY 1980 Planned Program: FY 1980 funding is increased approximately 4% compared to FY 1979. Most of this increase is for inflation. A small provision ($180 thousand) is also made in FY 1980 to rebuild Tropic Test Center ranges and storage facilities and to move instrumentation, as a result of the Panama Canal Treaty requirement to move out of Gamboa forest. Projected workload will continue to greatly exceed test capability. Improvement and modernization of the seven facilities will be continued and will be designed to provide test capabilities compatible with new weapons technology. Examples of planned tests and modernization activities are noted in the RDTE Congressional Descriptive Summaries for each proving ground or range. Planned natural cold weather and humid tropic environmental tests include: XM-1 tank, ROLAND, BLACKHAWK utility helicopter, and VINSON Wide-Band Secure Voice Device. Improvements will be made in vehicle and ballistic test instrumentation at the Cold Regions Test Center and in range and laboratory analysis instrumentation at Tropic Test Center.

4. FY 1981 Planned Program: The planned program provides for expansion in improvement and modernization of test facilities and for a significant reduction in the backlog of essential maintenance and repair. These will be designed to increase productivity and permit avoidance of test delays due to breakdowns of instrumentation and capital equipment. A start will be made in re-establishing adequate inventory levels of essential repair parts for instrumentation and capital equipment and of other materials and supplies. Planned natural cold weather and humid tropic environmental tests include: Infantry Fighting Vehicle, Artillery Locating Radar, Remotely Monitored Battlefield Sensor System, and Biological Agent Alarm.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE90 Title: Yuma Proving Ground

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: In August 1962, concurrently with establishment of the US Army Test and Evaluation Command (TECOM), Yuma Test Station was designated a Class II Installation under TECOM. It was redesignated as Yuma Proving Ground (YPG) in August 1963. YPG is one of 26 major ranges of the Department of Defense (DoD) Major Range and Test Facility Base. The assigned mission is to plan, conduct, evaluate, report on, and support developmental and other test of aircraft armament, long-range artillery, and air delivery and mobility systems. YPG also conducts natural desert environmental tests and provides personnel to support arctic environmental tests at the US Army Cold Regions Test Center, Fort Greely, AK, as directed by HQ, TECOM. Land area comprises more than 1 million acres with restricted airspace ranging from surface to 80,000 feet. Major facilities include a 420,000 acre artillery firing range with 21 firing positions, a maximum range capability to 74,000 meters and three fully instrumented impact areas; a 420,000 acre air-to-ground and ground-to-ground fully instrumented aircraft armament range; an instrumented air delivery test area of 1,000 acres containing separate drop zones for equipment, personnel and hazardous items; and a mobility test area comprising 78,000 acres including gravel, hill, sand, and rock courses, test slopes of varying grades, swimming and fording facilities and a two-mile dynamometer course. This project finances the costs of operating and maintaining the proving ground and those indirect costs for testing not reimbursed by users. It has three broad task areas: procurement of instrumentation, base operations and test support.

B. RELATED ACTIVITIES: Project DE90 is one of seven projects established in FY 1975 comprising Program Element (PE) 6.58.04.A. Four of the other projects finance costs at White Sands Missile Range, NM; the Army Electronic Proving Ground, Ft Huachuca, AZ; Dugway Proving Ground, UT; and the Materiel Testing Directorate, Aberdeen Proving Ground, MD. These four installations/activities, YPG, and 13 other test and evaluation facilities operate under a uniform policy within the DoD Major Range and Test Facility Base. Under this policy, the facilities finance all indirect testing costs with the users or test proponents at these facilities paying all direct testing costs. YPG is also one of the three Army installations/activities responsible for natural environmental testing. The other two, the US Army Cold Regions Test Center, Fort Greely, AK, and the US Army Tropic Test Center in the Panama Canal Zone, are funded on a level-of-effort basis (direct and indirect costs) wherein testing services are provided users on a non-reimbursable basis.

C. WORK PERFORMED BY: Work is performed by Department of Army civilian and military personnel with associated contractual support. Telecommunications services are provided by the US Army Communications Command, Ft Huachuca, AZ. Navajo Army Depot, Flagstaff, AZ, provides ammunition storage support. Potential contracts during FY 1980 include: IBM, Owego, NY; University of Arizona, Tucson, AZ, and Hewlett Packard Company, Palo Alto, CA.

Project: #DE90 Title: Yuma Proving Ground

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Tests of equipment and systems included: Enhanced COBRA Armament Program; Desert Test of XM-1; Rocket Assisted Projectiles; BUSHMASTER; Family of Military Engineer Construction Equipment (FAMECE); Armored Personnel Carrier (APC) M113A1E1; Tank Thermal Sight; acceptance testing of 105mm tank cartridge components. Yuma Proving Ground (YPG) has developed a highly sophisticated range capability with real-time, multitarget space position capability. Such instrumentation as precision laser trackers, graphic display network, multitarget trilateration position locating system, telemetry data processing, radar and optical tracking, high frequency data recording and video scoring all integrated into a computer controlled network, gives YPG a unique capability for testing Army aircraft and artillery weapons systems.

2. FY 1979 Program: Scheduled work exceeds capability for its performance by approximately 45%. YPG is investigating the availability of potential contractors to augment its test capability and thus minimize the impact of the excess workload. Scheduled major tests include: Advanced Attack Helicopter (AAH); Joint Global Positioning System (GPS); improved conventional munitions and nuclear projectiles for 8" and 155mm; Surface Launched Unit-Fuel Air Explosive (SLUFAE); XM198 155mm Towed Howitzer; Improved Tube-launched, Optically-tracked Wire-guided (TOW) System Vehicle; personnel, equipment and supply air drop systems; PATRIOT air transportability and storage; Tank conversion of M48A1 to M48A5; and Enhanced COBRA Armament Program. Instrumentation improvement and modernization includes an additional laser tracker to fill in range coverage for such projects as the AAH. Other instrumentation projects include completion of interactive test director's display network and tracking mounts for artillery projectile function monitoring.

3. FY 1980 Planned Program: Projected workload exceeds projected capability by approximately 45%. This will be accommodated by increasing contractor support, using overtime and deferring lower priority testing, as necessary. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Scheduled tests include: AN/USD-502 Long Range Surveillance System; AAH; RANDOM Time Delay Submunitions Projectile; surveillance/storage tests for SHILLELAGH, STINGER, PATRIOT, TOW, LANCE, and DRAGON; 105mm, 155mm, and 8" projectiles; airdrop tests of PATRIOT; 66mm Rocket; Type V platform and personnel equipment; infrared jammer; tactical rigid wall shelter; night vision goggles; APC M113 (Diesel); M60A1/M60A3 conversion program. Prior fiscal year efforts will be continued to modernize, update and automate existing data acquisition and analysis capabilities and to replace obsolete and inefficient equipment. This will include expansion of graphic display capability, radar chronographs to eliminate labor intensive use of velocity coils for muzzle velocity measurement, instrumentation for a new range to test modern tank and antitank weapons such as the XM-1 tank, and data transmission to tie in range instrumentation to a central control center.

Project: #DE90 Title: Yuma Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

4. FY 1981 Planned Program: Projected workload will continue to exceed capability. Scheduled tests include: Interim High Altitude Airdrop Resupply System; Advanced Attack Helicopter (AAH); ultrahigh-level container airdrop system; ammunition acceptance, renovation, and product improvement; and M60A1/M60A3 conversion program. Procurement will be completed of several improvements begun in prior years to include graphic display capability. In addition, there will be procurements of a command and control system to increase safety at firing and armament ranges and to expand range workload capabilities, infrared target arrays for helicopter fire control and additional instrumentation for the tank armament range as well as a variety of replacement items to maintain and improve capability.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	15454	15374	18441	19999	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	15671	19421	20511	-	Continuing	Not Applicable
Other Appropriations:						
Military Construction, Army						
Funds (current requirements)	-	-	6417	7939	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)		Not shown				

The current FY 1979 and FY 1980 RDTE estimates have been decreased from last year's estimates. This represents a reduction of improvement and modernization due to new higher priority requirements (e.g., establishment of a capability to test 120mm gun for XM-1 at Aberdeen Proving Ground). It also assumes an increase in reimbursements by users of the test facility.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE91 Title: Aberdeen Proving Ground (Materiel Test Directorate)

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: Aberdeen Proving Ground (APG), MD, is an installation of the US Army Test and Evaluation Command (TECOM), a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). The Materiel Test Directorate of APG has assigned missions to conduct tests of weapon systems, rocket and missile systems, munitions and components, survey and target acquisition equipment, combat special and general purpose vehicle and ancillary automotive equipment, combat engineer equipment and troop support equipment; to provide a radiative environment simulating the neutron output of a nuclear weapon using a fast burst nuclear reactor; and to conduct nuclear radiation survivability evaluations. With its 75,000 acres, half of which are under water, instrumented firing of weapons up to ranges of 34,000 meters is possible and approximately 100 firing positions are available for testing different types of weapons and equipment. The Munson Test Area contains facilities to test and evaluate wheeled and tracked vehicles and their component systems, and consists of dust, rock, hill, level, dynamometer, paved, Belgian block and gravel courses. Test slopes with grades from 10% to 60%, turning radii circles, and suspension and vibration test courses are also available. This project finances the costs of operating and maintaining the Materiel Test Directorate of Aberdeen Proving Ground and those indirect testing costs not reimbursed by users. It has three broad task areas; procurement of instrumentation, base operations and test support.

B. RELATED ACTIVITIES: Project DE91 is one of seven projects that comprise Program Element (PE) 6.58.04.A. Four of the other projects finance costs at Yuma Proving Ground, AZ; Dugway Proving Ground, UT; White Sands Missile Range, NM; and the US Army Electronic Proving Ground, Ft Huachuca, AZ. These five test facilities plus 13 other test and evaluation facilities of the Department of Defense (DoD) operate under a uniform funding policy for test and evaluation services within the overall DoD Major Range and Test Facility Base. The other two projects in this element are the two environmental test centers, the Cold Regions and Tropic Test Centers, which are funded on a level-of-effort basis with testing services furnished on a non-reimbursable basis.

C. WORK PERFORMED BY: Work is performed by Department of the Army, (APG, MD) civilian and military personnel. Telecommunication services are provided by the US Army Communications Command, Ft Huachuca, AZ. Only a small portion (about $300,000) of the Materiel Test Directorate's work is done by contractors.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Prior accomplishments include: testing of Army tactical vehicles on the Munson and Perryman automotive test courses; sophisticated, highly instrumented, ballistic testing of Army weapons and the families of munitions fired from them; establishing electromagnetic interference measurement and establishing a capability to enable measuring electromagnetic compatibility or interference as part of vehicular, electronic or communications equipment testing; and procurement of an automatic target scoring system for large and small caliber direct fire weapons and of instrumentation to measure

vehicle performance and course severity. During FY 1978, the Materiel Testing Directorate completed 316 tests including: 81 developmental, 112 production and post production, and 30 product improvement and malfunction investigations. Testing projects included: XM-1 Tank Armor System Protection; Aluminum Armor for M113A1 Vehicle Family; acceptance of aluminum and steel armor; simplified test equipment for internal combustion engines; XM-1 Tank; product improved M60 Tanks; 105mm and 152mm tank gun cartridges; 105mm data base program for kinetic energy penetration performance; fire resistant hydraulic fluids; thermal sight for M60 tank, Navy Capital Ships Structure Program; high mobility vehicles; (heavy equipment transporter); Tripartite ammunition evaluation with Germany and Great Britain; 105mm gun (M68) for M60, M48A5, and XM-1 tanks; 20mm gun M139; AMATEX-20 loaded artillery projectiles; joint Department of Defense/Department of Energy soft recovery test of 8-inch projectile; fuzes; 105mm and 8-inch howitzers; 155mm cannons, tube assemblies and mounts; Gun Low Altitude Air Defense System; 200 Kw, 60hz generator set; multileg mooring system; lightweight company mortar and ammunition. Instrumentation was procured for the automatic data analysis and processing technique (ADAPT) system which, when completed, will accept input data from test instrumentation, analyze the data, compare it with expected values, store it, and reproduce it in report format. APG has also procured video test instrumentation, and a solid state ballistics data acquisition system.

2. FY 1979 Program: Scheduled test workload exceeds current test capability by more than 50% inherently leading to test delays. APG is investigating the availability of potential contractors to augment its test capability and thus minimize the impact of the excess workload. Scheduled test projects include: M60 Tank Product Improvement Program; M113A1E1 Armored Personnel Carrier; Drivers Night Viewer, AN/VVS-2; 10 Ton High Mobility Truck; XM-1 Tank; Improved 81mm Mortar; 155mm Howitzer; ROLAND Air Defense Missile System; Squad Automatic Weapon; Ground Vehicle Mine Dispensing System; ribbon bridge; a variety of air conditioners and generator sets; 105mm cartridges; Division Air Defense (DIVAD) Gun; and proofing of tank and artillery weapons (105mm, 155mm, and 8-inch). A modest amount of instrumentation improvement and modernization will be accomplished and will include continued efforts for the ADAPT system, increased flash X-ray capability and upgrade of some radars to utilize a digital format which can be fed directly into automatic data processing equipment.

3. FY 1980 Planned Program: Projected test workload will exceed projected capability by more than 50%. This will be accommodated by increasing contractor support, using overtime and deferring lower priority testing, as necessary. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Scheduled test projects include: XM-1 tank and its 120mm gun; 75mm Cannon; M60A1/M60A3 Tank conversion program; DIVAD Gun; and 5-Ton Truck, M809. Instrumentation will be acquired that will provide data in digital format from tests of vehicular fire control systems, air defense systems, marine systems, and other equipment. The data will be transmitted in pulse codes directly to the ADAPT system. A major effort will also be made to modernize the data reduction and analysis capability in the labor intensive areas of projectile lethality testing and small arms testing.

Project: #DE91 Title: Aberdeen Proving Ground (Materiel Test Directorate)
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

4. FY 1981 Planned Program: Scheduled test projects include: XM-1 tank; Portable Mine Neutralization System; and proofing of armor plate and weapons. The trend toward a very heavy test workload will continue in the area of new combat vehicle and munitions development testing. Instrumentation will be acquired to support automation of data acquisition and processing for testing of air defense, combat fire control, weapons/munitions and automotive/general equipment.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	18462	21458	23450	23118	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	19123	18953	20044	-	Continuing	Not Applicable

The FY 1978 decrease represents funds transferred to high priority major RDTE programs. The current FY 1979 and FY 1980 estimates are increased to establish a capability for testing the 120mm gun for the XM-1 tank, and to provide for increased contractor support to cope with the excess workload.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE92 Title: Dugway Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: Dugway Proving Ground (DPG), UT, is an installation of the US Army Test and Evaluation Command (TECOM), a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). DPG has a unique mission to plan, conduct, and report on tests that assess the military value of chemical weapons and chemical/biological defense systems and development, laboratory tests, field tests, and investigations to support this mission, including meteorology, ecology, epidemiology, and test technology. Effective 1 July 1974, DPG was designated a major test facility within the Department of Defense Major Range and Test Facility Base. It operates under a uniform Department of Defense (DoD) reimbursement policy for major ranges and test facilities wherein users of these facilities pay all direct test costs and this project finances indirect costs of testing and the costs of operating and maintaining the proving ground.

B. RELATED ACTIVITIES: DPG is one of seven TECOM installations/activities in this program element. Four of the others also operate under the uniform DoD funding policy. These are: White Sands Missile Range, NM; Yuma Proving Ground, AZ; US Army Electronic Proving Ground, Ft Huachuca, AZ; and the Materiel Test Directorate, Aberdeen Proving Ground, MD. The other two projects are the Cold Regions and Tropic Test Centers which are funded on a level-of-effort basis wherein testing is conducted for users on a nonreimbursable basis.

C. WORK PERFORMED BY: Test and evaluation services are performed by assigned Department of the Army civilian and military personnel with associated contractual support. Contractors include: Hawthorne Aviation (Aircraft Maintenance), Charleston, SC; International Business Machine (IBM) (Automated Data Processing (ADP) Maintenance), Owego, NY; and Tri-State Maintenance (Janitorial), Salt Lake City, UT. Contractual support for FY 1980 including maintenance and repair of facilities is estimated at $1,776,000.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Accomplishments included: Demilitarization of Chemical Testing Residue; and testing of biological agent alarm, M51 Chemical/Biological Shelter System, 155mm Smoke projectiles, binary projectiles, TOMAHAWK cruise missile for the US Navy, Remotely Piloted Vehicles for the US Air Force, and Insecticide Spray System for the US Forest Service. Investigations completed include: baseline ecological surveys of demilitarization and manufacturing sites; development of diffusion models and concepts; foreign biological threat and vulnerability assessments; and migration of hazardous substances through soil for the Environmental Protection Agency. Instrumentation acquisitions included items such as: smoke field instrumentation for measuring quantity, quality, and obscuration characteristics of smoke munitions; range safety and control systems; film readers and calibration equipment; defensive test chamber for conducting inclosed chemical challenge tests of protective systems; and test data interface equipment.

Project: #DE92 Title: Dugway Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: Scheduled test workload exceeds test capability by approximately 30%. Dugway Proving Ground (DPG) will investigate the availability of potential contractors to augment its test capability and thus minimize the impact of the excess workload. Scheduled test projects include: 105mm smoke cartridge; 155mm and 8-inch binary projectiles; BIGEYE weapon (Navy); Protective Outfit, Toxicological Breathing Apparatus; Jet Exhaust-Powered Decontamination System. Evaluations include: operational feasibility of detecting chemical warfare contamination, technical assessment of foreign biological threat, Remotely Piloted Vehicle (RPV) support for the USAF and the USN TOMAHAWK program. Instrumentation will be acquired to improve and modernize capability for particulate and smoke field tests. A significant effort will be made to renovate the Baker Laboratory, the primary Department of Defense facility for testing and experimentation associated with pathogenic organisms.

3. FY 1980 Planned Program: Projected workload exceeds projected test capability by more than 50%. This will be accommodated by increasing contractor support, using overtime and deferring lower priority tests, as necessary. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Scheduled tests include: 155mm incapacitating projectile; soft ring airfoil projectile, XM742; lethal warhead for helicopter selective effects armament systems 66mm, Tactical Combat Support Rockets; Deep Target Incapacitating Weapon; M43E1 Detector Units for M8 Chemical Agent Alarm; Decontamination Apparatus for Vehicles. Investigations include: contingency disposal procedures for spray munitions; effects of environmental factors on biological decay and technical assessment of foreign biological threats; and continued support for the USAF RPV program. Instrumentation acquisitions will include items such as: oven for decontamination of materiel exposed to chemical environments; improvement of defensive test chamber for conducting inclosed chemical challenge tests of protective systems; and test data interface equipment.

4. FY 1981 Planned Program: Scheduled test projects include: riot control rescue system; riot control convoy system; and detector kit for waterborne chemical agents. Support will be provided for USAF Air-Launched Cruise Missile and the USN TOMAHAWK Cruise Missile programs. Evaluations include: technical assessment of foreign biological threat and development of automatic chemical analyzer. Improvement and modernization will include automation enhancement of particulate and smoke testing capability and replacement of obsolete chemical, life sciences, photographic, and calibration equipment. A modest effort will be devoted to maintenance and repair of the physical plant (e.g., plumbing, roads, parking lots, and exterior and interior painting of buildings).

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

Project: #DE92 Title: Dugway Proving Ground

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

7. Resources ($ in thousands):

RDTE	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	11940	12190	12640	14933	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	12527	10721	16587	--	Continuing	Not Applicable

The FY 1978 decrease represents funds transferred to high priority major RDTE programs. The current FY 1979 estimate has been increased to provide for urgently needed maintenance and repair of facilities, including renovation of the Baker Laboratory, and for added physical security requirements. The current FY 1980 estimate has been decreased to provide for high priority requirements in other programs (e.g., testing of 120mm gun for XM-1 tank). Improvement and modernization and maintenance and repair of facilities will be reduced from that included in the prior estimate and partially rescheduled to FY 1979.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE93 Title: White Sands Missile Range

Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: White Sands Missile Range (WSMR), NM, is an installation of the US Army Test and Evaluation Command (TECOM), a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM), with the primary mission of supporting missile, aircraft, and space vehicle tests of various national programs to include Defense Advanced Resarch Projects Agency (DARPA), National Aeronautics and Space Administration (NASA), and Department of Energy (DOE). To meet increasingly complex and stringent range user requirements, a modernization program was established in FY 1964 to insure that technological advances in range capabilities paralleled advances in weaponry. This range occupies a land area of about 40 miles wide and 100 miles long and supports 250 to 300 different projects annually. Missiles are fired from launch sites such as Green River, UT, and impact on White Sands Missile Range, a distance of over 500 miles. Launch sites are available to test missiles, drones, space vehicles, and related technical components. Facilities for performing static tests of rocket motors are also available. A Nuclear Effects Facility is capable of testing the effects of radiation on materials at predetermined levels of nuclear blast or environment. A new mission to support high energy laser testing was recently assigned and a tri-Service High Energy Laser System Test Facility is being established.

B. RELATED ACTIVITIES: Project DE93 (WSMR) is one of seven projects comprising Program Element (PE) 6.58.04.A. Four of these projects finance indirect costs of operating Yuma Proving Ground, AZ; Materiel Test Directorate, Aberdeen Proving Ground, MD; Dugway Proving Ground, UT; and the Army Electronic Proving Ground, Ft. Huachuca, AZ. These four test facilities, WSMR, plus 13 other test and evaluation facilities of the Department of Defense (DoD) operate under a uniform funding policy within the overall Major Range and Test Facility Base of the Department of Defense. WSMR is one of two national ranges managed by the Army, the other being Kwajalein Missile Range (KMR). There is close and continuous coordination between WSMR, other national ranges, other service test and evaluation activities, and developing agencies to insure optimum support to all DoD programs and to avoid duplication and inefficiency. The Cold Regions Test Center and Tropic Test Center, the remaining two facilities in PE 6.58.04.A, are funded on a level of effort basis wherein they perform testing services on a nonreimbursable basis.

C. WORK PERFORMED BY: Contract support to WSMR will total approximately $25 million during FY 1979. Contractors include RCA, Moorestown, NJ; Physical Science Laboratory, New Mexico University, Las Cruces, NM; IBM, Owego, NY; Lockheed Engineering Services Division, Houston, TX; International Sensor Systems, Aurora, NE; Vega Enterprises, El Paso, TX; and Dynalectron Corporation, Albuquerque, NM. Government agencies providing support include US Army Communications Command, Ft. Huachuca, AZ; Defense Mapping Agency, Washington, DC; US Army Research Office, Durham, NC; Lexington Army Depot, Lexington, KY; US Air Force Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM; and Department of Commerce, National Bureau of Standards, Washington, DC.

Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: White Sands Missile Range (WSMR) supported Department of Defense (DoD) and National Aeronautics and Space Administration (NASA) programs providing test and evaluation services to developers of missile and related systems. Major test projects include PATRIOT Air Defense System; PERSHING II and LANCE Ground-to-Ground Missile Systems; HAWK and US ROLAND Mid-Range Air Defense Missiles; CHAPARRAL and STINGER Short-Range Air Defense Missile Systems; Tactical Fire Direction System (TACFIRE); COPPERHEAD Cannon-Launched Guided Projectile; Nuclear Weapons Effects Program; Navy TOMAHAWK Cruise Missile; Navy Air Weapons; and NASA Space Shuttle. Major improvement and modernization procurement actions included equipment for the High Energy Laser System Test Facility, Distant Object Attitude Measurement System, cinetheodolite and camera modernization, and Drone Formation Control System.

2. FY 1979 Program: Scheduled workload exceeds that accomplished in FY 1978 and exceeds test capability by approximately 30%. WSMR is investigating the availability of additional potential contractors to augment test capability. Major projects to be supported include PATRIOT, US ROLAND, STINGER, COPPERHEAD, PERSHING II, General Support Rocket System (GSRS), Nuclear Weapons Effects Program, Army Tactical Data Systems, Improved TOW Vehicle, and Navy Air Weapons. A major segment of the FY 1979 program is for the procurement of instrumentation and equipment for the tri-Service High Energy Laser System Test Facility. Other improvement and modernization tasks include Telemetry Microwave Relay System Modernization and Hybrid Computer Improvements.

3. FY 1980 Planned Program: WSMR will continue to operate the National Range and provide test and evaluation services in support of missile systems and other materiel developers. Projected workload exceeds projected capability by approximately 25%. This will be accomodated primarily by increasing contractor support and using overtime. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Major projects include Nuclear Weapons Effects Program, GSRS, Improved HAWK, PATRIOT, TACFIRE, US ROLAND, and Navy Air Weapons. Instrumentation improvement and modernization procurements include a major procurement of additional equipment for the High Energy Laser System Test Facility, Initiation of Environmental Test Area project, Radio Frequency Generation Equipment, completion of Drone Control/Project, Climatic Test Equipment and Telemetry Tracking System modernization. The High Energy Laser System Test Facility will become operational in FY 1980.

4. FY 1981 Planned Program: Projected workload is the same as the FY 1980 level and will continue to exceed WSMR capacity. Major tests to be supported include GSRS; lethal chemical warhead for GSRS; PATRIOT Missile Storage Reliability Program; STINGER System Passive Optical Seeker; Short Range Attack Missile (SRAM); and Navy Air Weapons Testing. Improvement and modernization of testing capability will emphasize acquisition of instrumentation for the High Energy Laser System Test Facility and replacement of obsolete and outmoded range instrumentation with technologically improved items that will provide expanded coverage more efficiently and at less costs. A modest reduction is programed in the backlog of essential maintenance and repair of test facilities.

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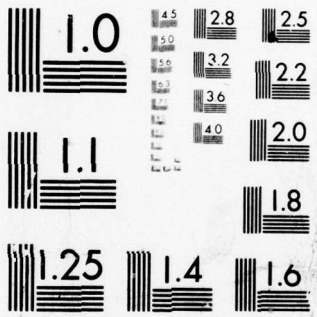

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Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	97930	105270	109753	114916	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	97892	100741	108379	-	Continuing	Not Applicable
Other Appropriations						
Military Construction, Army						
Funds (current requirements)	490	0	5732	3381	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)		Not shown*				

The current FY 1979 RDTE estimate is increased compared to last year's estimate to provide for restoration of damage due to August 1978 flash flooding. The current FY 1980 estimate is greater than the current FY 1979 estimate to enable the High Energy Laser System Test Facility to become operational and to provide for inflation.

* $33,449 thousand for High Energy Laser System Facility construction was included in FY 1978 amount shown for PE 6.58.04.A; however, this project has been transferred from MCA to Title IV (Construction of Defense Agencies Facilities).

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE94 Title: Army Electronic Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. DETAILED BACKGROUND AND DESCRIPTION: The US Army Electronic Proving Ground (AEPG), Ft. Huachuca, AZ, is a tenant on Ft. Huachuca and a Field Operating Activity of the US Army Test and Evaluation Command (TECOM), a subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). The proving ground was established in 1954. Its primary mission is to plan, conduct, evaluate, and report on and/or support developmental and other tests of Army communications, electronic, and electronic warfare systems and materiel. Other missions are to plan, conduct, and report on electromagnetic compatibility (EMC) and electronic countermeasure (ECM) test and analysis, and to operate and maintain two major test facilities: Electromagnetic Environmental Test Facility and System Test Facility. Responsibility for developmental testing formerly performed by the US Army Security Agency Test and Evaluation Center (ASATEC) was transferred to AEPG on 1 October 1977. The new mission encompasses developmental testing of tactical electronic warfare and signal intelligence equipment. Testing support is also provided to the other military Services. The natural quiet electromagnetic environment, real estate, and low annual rainfall of the area, together with its special facilities, make the AEPG capability unique within the Department of Defense. The majority of testing is conducted within its laboratories; on the System Test Facility, an outdoor electronic range; and in the Electromagnetic Environmental Test Facility, which is specifically designed to create the intended electromagnetic environment thus permitting analysis of equipment in simulated operational environments.

B. RELATED ACTIVITIES: Four other projects in this program element (PE) finance indirect costs of White Sands Missile Range, NM; Yuma Proving Ground, AZ; Dugway Proving Ground, UT; and the Materiel Test Directorate, Aberdeen Proving Ground, MD. These four, AEPG, and thirteen other DoD test and evaluation facilities operate under a uniform DoD Funding Policy. This project provides funding for indirect testing costs at AEPG; test proponents (users) pay all direct test costs. Two other projects in this PE are the Cold Regions and Tropic Test Centers, which are funded on a level-of-effort basis wherein testing services are provided on a nonreimbursable basis.

C. WORK PERFORMED BY: Testing is performed by military and civil service personnel assigned to AEPG, with associated contractor support. Major contractor effort involves the operation and maintenance of the Electromagnetic Environmental Test Facility and the Systems Test Facility by Bell Aerospace Company, Tucson, AZ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Test projects included Tactical Fire Direction System (TACFIRE); Training Devices for AH-1Q/COBRA and CH-47C/helicopters; Joint Services Interior Intrusion Detection System; Integrated FM/Radio Wideband Security Voice Device (BANCROFT); Platoon Early Warning System; Single Channel Ground and Airborne Radio System; UHF Manpack Satellite

Communications Ground Terminal; Tactical Computer System; Remotely Piloted Vehicles (RPV); Drone Program Support (USAF); Flight Control Central, AN/TSC-61A; Regenerative Repeater MX-9331; Digital Transmission Evaluation Program; QUICK LOOK II, ALQ-133; and CEFLY LANCER, AN/USQ-71. Instrumentation was procured to improve the capability for skin tracking and range safety through automatic acquisition of small airborne targets such as AQUILA drones at long range. Other instrumentation was procured to improve capabilities for development testing of absolute altimeters; weather balloons; and recently introduced all-digital DoD communications equipment.

2. FY 1979 Program: Scheduled testing workload at US Army Electronic Proving Ground (AEPG) is 15% above test capability. This excess is tolerable and provides management flexibility, making it unnecessary to keep a test facility idle when a scheduled test is unavoidably delayed. Major tests scheduled include: Central Office Communications, Automatic, AN/TTC-39 (TRI-TAC); Family of Digital Group Multiplexers (TRI-TAC); Position Location Reporting System; Single Channel Ground and Airborne Radio System; Radio Sets, AN/PRC-70; Satellite Communication Terminals; Remotely Monitored Battlefield Sensor System; Automatic Ground Transportable Emitter Location and Identification System, AN/TSQ-109; Tactical Communications Emitter Location and Identification Systems AN/TSQ-112; Wideband Secure Voice Device (VINSON); Tactical Narrowband Secure Voice Device (PARKHILL); Joint Global Positioning System Army User Equipment; and USAF RPV Drone Program. Instrumentation procurements include all-purpose digital communications which will provide capability for testing at higher frequency ranges, wider bandwidths, and in more diverse operating modes.

3. FY 1980 Planned Program: Projected testing workload will be 30% above projected capability. This will be accomodated primarily by increasing contractor support and using overtime. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. AEPG is investigating the availability of additional protential contractors to augment its test capability and thus minimize the impact of the excess workload. Projected tests include: Tactical Operations System (TOS); Central Office Communications, Automatic, AN/TTC-39 (TRI-TAC); Facility Intrusion Detection System; Digital Transmission Evaluation Program; RPV Support for the USAF; and electromagnetic compatibility analysis on PATRIOT/ROLAND missile systems. Emphasis will be placed on instrumentation to establish an adequate capability for testing of signal intelligence/electronic warfare equipment. Procurement will also be initiated for a mobile, high precision tracking radar that will provide total coverage of the test range.

4. FY 1981 Planned Program: Projected tests include: Tactical Operations System (TOS); Field Artillery Meteorological Acquisition System; Unit Level Switch Family (TRI-TAC); Integrated Inertial Navigation System, AN/ASN-132; Lightweight Tactical Digital Facsimile, AN-UXC-4. A major segment of the FY 1981 program is for the procurement of instrumentation to establish an adequate capability for testing electronic warfare equipment. Other instrumentation procurements include completion of the mobile tracking radar, closed circuit TV for unmanned aircraft tests, absolute altimeter standard, antenna measurement test instrumentation and infrared targets.

Project: #DE94 Title: Army Electronic Proving Ground

Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	8527	9033	10533	11430	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	8623	9961	12925	-	Continuing	Not Applicable
Other Appropriations						
Military Construction, Army						
Funds (current requirements)	0	216	3449	0	Continuing	Not Applicable
Funds (as shown in FY 1979 submission)	Not shown					

Current FY 1979 and FY 1980 RDTE estimates are decreased compared to last year's estimates. These reductions are due to higher priority requirements in other programs (e.g., testing of 120mm gun for XM1 tank).

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.05.A
DoD Mission Area: #610 - Technical Integration

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4416	5036	5492	6409	Continuing	Not Applicable
D620	DoD Munitions Effectiveness	3907	4514	4670	5887	Continuing	Not Applicable
M857	Explosive Safety Standards	509	522	822	522	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program consists of two projects each of which is structured to satisfy a specific need. Project D620 provides a coordinated tri-Service mechanism for the collection and free exchange of technical data on the performance and effectiveness of all nuclear and non-nuclear munitions and weapons systems in a realistic operational environment. This project is primarily concerned with the determination of munitions effectiveness data and the publication of that data in Joint Munitions Effectiveness Manuals (JMEM) for surface-to-surface (SS), air-to-surface (AS) and anti-air (AA) munitions. These manuals, then, provide the Services a uniform basis for munitions and weapons planning and employment and assist in the determination of future munitions concepts and requirements. This project also supports DoD agencies in the determination of vulnerabilities/survivability of selected systems and relative effectiveness analysis of current and developmental systems. Project M857 supports explosion effects research and testing to quantify hazards in all DoD manufacturing, testing, maintenance, storage and disposal aspects of ammunition and explosives. Results of these efforts are essential to the development of quantity-distance standards and the design of cost effective, explosion resistant facilities.

C. BASIS FOR FY 1980 RDTE REQUEST: Project D620 (DoD Munitions Effectiveness) will support the continuation of effectiveness evaluations for air-to-surface, surface-to-surface, and anti-air munitions/weapons through updating delivery accuracy, target acquisition and weapon characteristics. These evaluations will be further enhanced by inclusion of weapons systems entering the inventory of the Services and by expanding the types of targets for which effectiveness data is tabulated. Special emphasis will be placed upon: vulnerability of complex targets, Red-on-Blue effectiveness evaluations, and the inclusion of smoke, illumination and target acquisition effects in the effectiveness evaluations of air-to-surface and surface-to-surface weapons/munitions. Project M857 supports the Department of Defense Explosives Safety Board in its assigned responsibility to formulate, validate, and continually improve standards for the safe manufacture, storage, transport, maintenance, and disposal of ammunition and explosives by conducting the ESKIMO VI test of the safety of storage in large, flat-roofed, earth-covered magazines, and through the performance of post-test data analysis and theoretical studies to interpret the results of ESKIMO VI. Thermal output

from stored arrays of combustible ordnance material will be investigated by identifying parameters which control the radiant intensity and the field of firebrands. Work will be initiated on the preparation of a revised edition of the tri-Service manual, TM 5-1300 (NAVFAC P-397, AFM 88-22), Structures to Resist the Effects of Accidental Explosions. Tests of stacks of packaged fragment-producing ammunition will continue.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	4416	5036	7236	Continuing	Not Applicable

FY 1980 funds are reduced as a more definite scope of work has been developed with greater consolidation of effort and expanded in-house government participation in planned analyses/evaluations.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.05.A
DoD Mission Area: #610 - Technical Integration

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: Project D620 (DoD Munitions Effectiveness): The Joint Technical Coordinating Group, Munitions Effectiveness (JTCG/ME) was established by Joint Chiefs of Staff Directive in 1963 and manages the effort conducted under this project. The JTCG/ME responds to directives from the commanders of the Army Materiel Development and Readiness Command, Navy Materiel Command, Air Force Logistics Command, and Air Force Systems Command. Steering-committee membership includes representatives from the Army, Navy, Air Force, Marine Corps, and the Defense Intelligence Agency. Quarterly meetings are held to review, in detail, current and planned programs. The project further provides the basis for the definition of and recommendation for corrective action to the Joint Logistic Commanders of problem areas and/or knowledge gaps related to munitions and weapons effectiveness; serves as a focal point for Joint efforts to improve the data base and analytical methodology used in the determination and prediction of non-nuclear munitions and weapons effectiveness in a realistic operational environment; and, provides a means for the development, publication, and update of Joint Munitions Effectiveness Manuals (JMEM's) on a continuing basis. These manuals provide to the Services a uniform basis for munitions and weapons employment, planning and use, the determination of munitions and weapons requirements, and the evaluation of new munitions and weapons concepts. Work in this project includes the preparation of JMEM's for air-to-surface, surface-to-surface, and anti-air munitions/weapons systems; investigations in aircraft attrition; and, supporting efforts in target vulnerability and survivability, selected systems effectiveness, and battle-damage assessment. Ad hoc tasks are undertaken as required to assist in the resolution of data deficiencies relative to existing munitions/weapons and their effectiveness. Project M857, Explosive Safety Standards, provides for full-scale testing and supporting analysis directed toward improvement of tri-Service explosives and ammunition safety standards. The DoD Explosives Safety Board, which manages this project, assesses blast, fragment, thermal and toxic hazards to personnel and structures from potential accidental detonation of stored ammunition; develops design procedures for protective structure design and construction; and, establishes operating safety standards and quantity-distance tables. The Board also establishes design procedures and storage layout criteria for magazines and explosive handling/manufacturing facilities.

G. RELATED ACTIVITIES: This program is a consolidation of Project M857 (Armed Services Explosive Safety Board) and Project D620 (Ammunition Effectiveness Testing) from Program Element 6.57.02.A (Support of Development Test) to provide a single element concerned with testing and evaluation of ammunition effectiveness and safety.

H. WORK PERFORMED BY: Approximately 75 percent of Project D620 work is accomplished by the following in-house organizations. US Army Materiel Systems Analysis Activity, the Ballistic Research Laboratory and the Chemical Systems Laboratory at Aberdeen Proving Ground, MD; US Army Missile Research and Development Command, Redstone Arsenal, AL; US Army Armament Research and Development Command, Dover, NJ; US Army Armament Materiel Readiness Command, Rock Island, IL; Dugway Proving Ground, UT; The Air Force Armament Laboratory, Eglin Air Force Base, FL; Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, OH; Oklahoma City Air Logistics Center, Tinker Air Force Base, OK; Naval Research Laboratory, Washington, DC; Naval Surface Weapons Centers, at White Oak, MD, and Dahlgren, VA; Pacific Missile Test Center, Pt. Mugu, CA; and the Naval Weapons Center, China Lake, CA. The project contractors are: Oklahoma State University at Eglin Air Force Base, FL, and Stillwater, OK; Falcon

Research and Development, Inc., at Denver, CO, and Albuquerque, NM; Booze-Allen Applied Research, Inc., Bethesda, MD; Denver Research Institute, Denver, CO; and the University of Maryland Institute for Emergency Medicine, Baltimore, MD. Approximately 80 percent of project M857 work is accomplished by the following DoD organizations: Naval Weapons Center, China Lake, CA; Naval Surface Weapons Center, Dahlgren, VA; and US Army Ballistics Research Laboratory, Aberdeen Proving Ground, MD; and Naval Civil Engineering Laboratory, Port Hueneme, CA.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Project D620 (DOD Munitions Effectiveness) has produced the Joint Munitions Effectiveness Manuals on Air-to-Surface (JMEM/AS) and Surface-to-Surface (JMEM/SS) ammunition in addition to other manuals addressing weapon accuracy, vulnerability, characteristics, and joint testing procedures. Realistic validation of analyses were obtained through comparisons with battle data obtained during Vietnam and mid-East conflicts. Studies on the vulnerability of US forces to chemical and biological attack and decontamination requirements in a chemical warfare environment were also completed. During FY 1977, JMEM manuals were updated and the Target Vulnerability manual was revised. Multiple fragment tests of various materials versus aircraft fuel cells were completed. Effort was initiated on effectiveness evaluations of the VULCAN, HAWK, and CHAPARRAL air defense systems. The vulnerability of various industrial targets was assessed for the Strategic Air Command (SAC). Vulnerability assessments were also conducted on nuclear materials production facilities, cargo handling seaports, the ZSU 23-4 and ZSU 57-2 air defense weapons, and on the FITTER, FENCER, FLOGGER and HIND A aircraft. Target descriptions of the SS-12, SA-8, and SA-9 missiles were completed. Extensive survivability assessments were accomplished. In FY 1978 effectiveness manuals were updated through inclusion of the GBU 15, 12, 16, and 10 versus two new Soviet ships and through inclusion of the delivery accuracy of the Maverick, A-10, F-11, and A7E aircraft. Effectivness manuals were prepared on the LANCE missile, M110 howitzer, VULCAN, HAWK, and CHAPARRAL air defense weapons. The Surface-to-Surface manuals were updated with guided projectile effectiveness data against stationary and moving point targets. Project M857 (Explosive Safety Standards) conducted a series of explosive tests (ESKIMO) on full-scale, earth-covered ammunition magazines which have led to establishing criteria for more efficient use of storage areas while maintaining safety standards. These tests have also permitted evaluation of the explosion resistance of several different magazine designs and have identified construction economies and validated quantity-distance standards. Efforts have also included evaluation of unexploded ordnance detection techniques and equipment as well as development of guidance pertaining to clearance and release of former ammunition impact areas for other uses. A major project effort has been, and will continue to be, testing and analyses of the fragment distribution and velocity profiles of exploding stacks of munitions in order to improve current standards for fragment protection. Post-test analysis of ESKIMO V was completed, and a detailed plan was developed for the ESKIMO VI test of large, flat-roofed, earth-covered magazines. Model studies of magazines were conducted to augment the full-scale data, and to aid in the design of the ESKIMO tests. Effort was initiated on a study of the methodology needed to characterize thermal effects from combustible ordnance material.

Program Element: #6.58.05.A
DoD Mission Area: #610 - Technical Integration

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Defensewide Mission Support

2. FY 1979 Program: D620 (DoD Munitions Effectiveness) will continue to update the Joint Munitions Effectiveness Manuals for Air-to-Surface and Surface-to-Surface (JMEM/AS and JMEM/SS) with new information on delivery accuracy, target acquisition, weapons characteristics and smoke and illumination effects. The manuals will also expand on the type targets considered and the vulnerability/survivability of weapons systems and crew personnel. Support will continue on human survivability/vulnerability and medical work load problems. Analysis support for the Service staffs and the materiel development and user community will continue for major programs. Project M857, Explosives Safety Standards, will sponsor jointly with the Navy the ESKIMO VI test of an existing Navy design for a smokeless powder and projectile magazine, and a strengthened version of the same magazine, to qualify the former for general-purpose explsoves storage, and to evaluate the level of conservatism in available methods for explosion-resistant design. Tests of large stacks of mass-detonating palletized projectiles and of progressively detonating, packaged ammunition will be conducted to extend fragmentation hazard data obtained in previous experiments with small clusters and small stacks of the same weapons. Thermal effects studies will be extended to characterize the thermal output from arrays of combustible material.

3. FY 1980 Planned Program: Both projects will continue efforts toward the joint determination, publication, and use of enhanced and expanded munitions effectiveness data and explosive safety criteria. Project D620 will continue to conduct effectiveness analysis to support development decisions and establishment of new materiel requirements. Project M857, Explosives Safety Standards, will conduct post-test analysis of data from ESKIMO VI and theoretical studies to interpret the results. Tests of large stacks of fragmenting ammunition will be continued. Work will be initiated on the preparation of the revised edition of TM 5-1300, Structures to Resist the Effects of Accidental Explosions. Thermal effects studies will be extended to evaluate the terminal effects of irradiance and attack by burning debris on exposed surfaces.

4. FY 1981 Planned Program: Project D620 will continue to conduct munitions effectiveness analysis to assist all Services in development projects and program decisions. Project M857 anticipates publishing the revised edition of TM 5-1300, and issuing major revisions to the quantity-distance standards for fragment-producing ammunition. Effort will be initiated on the formulation of new standards for nondetonable propellants, pyrotechnics, and incendiary materials.

5. Program to Completion: This is a continuing program.

FY 1980 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.98.A
DoD Mission Area: #641 - Other Management Support

Title: Army Management Headquarters Activities
Budget Activity: #6 - Defensewide Mission Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1978 Actual	FY 1979 Estimate	FY 1980 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	16058	26350	25114	25714	Continuing	Not Applicable
HH02	Army Management Headquarters Activities (AMHA)	16058	26350	25114	25714	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports those research and development (R&D) command elements that substantially perform: (1) policy and guidance development; (2) long-range planning, programing, and budgeting; (3) management and distribution of resources; and (4) program performance review and evaluation. This is a new program element (PE) which was directed by Office, Secretary of Defense (OSD), for the purpose of uniformity in programing, reporting, and justifying Management Headquarters Activities. Resources reflected in this PE support civilian personnel performing listed functions and associated costs (personnel benefits, travel, operating supplies, and equipment) at US Army Materiel Development and Readiness Command (DARCOM) Headquarters and subordinate R&D commands.

C. BASIS FOR FY 1980 RDTE REQUEST: Program request is based on authorized civilian personnel (salaries and related costs) performing Research, Development, Test and Evaluation (RDTE) management functions at DARCOM Headquarters and subordinate R&D commands. Requested program supports full implementation of the Army Materiel Acquisition Review Committee (AMARC) recommended realignment of DARCOM subordinate commands into separate R&D and Readiness commands. This realignment included a shift of $7.5 million and associated spaces from the Operation and Maintenance, Army, appropriation to RDTE effective in FY 1979.

D. BASIS FOR CHANGE BETWEEN FY 1980 AND FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE					
Funds (as shown in FY 1979 submission)	16058	26879	26832	Continuing	Not Applicable

Program Element: #6.58.98.A
DoD Mission Area: #641 - Other Management Support

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Differences between FY 1980 and FY 1979 Congressional Descriptive Summaries (CDS) resulted from personnel turbulence (mission and function transfers, relocations, and reassignments) associated with realignment of US Army Materiel Development and Readiness Command (DARCOM) Research and Development (R&D) commands and identification of Program Element (PE) 6.58.98.A, Army Management Headquarters Activities (AMHA) mission versus supporting missions funded in PE 6.58.01.A for Programwide Activities. Additionally, FY 1979-1980 programing in the FY 1979 CDS included operation of the Corps of Engineers R&D Headquarters activity which is actually a Program Element (PE) 6.58.01.A mission and is reflected in that PE in this submission.

E. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.98.A
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F. DETAILED BACKGROUND AND DESCRIPTION: Resource requirements for this program element (PE) are programed in accordance with Department of Defense (DOD) Directive 5100.73, Department of Defense Management Headquarters, dated 11 April 1975, which contained instructions to update the DOD system for identification and management of the number and size of DOD Management Headquarters Activities. DOD Directive (DODD) 5100.73 further identified the type of functions to be included in the PE. Paralleling this action, US Army Materiel Development and Readiness Command (DARCOM) subordinate headquarters were realigned into separate Research and Development (R&D) and Readiness commands in accordance with Army Materiel Acquisition Review Committee (AMARC) recommendations. This combination of changes resulted in a shift of resources between appropriations as well as between Research, Development, Test and Evaluation (RDTE) PEs. These resource adjustments result in increased requirements beginning in FY 1979, which will be the first full year of operation under the new PE. The programed increases for this PE are offset elsewhere in the overall Army funding posture.

G. RELATED ACTIVITIES: Management headquarters perform planning, programing, management, and evaluation for work performed at RDTE laboratories and test facilities.

H. WORK PERFORMED BY: DARCOM Headquarters, Alexandria, VA, and DARCOM subordinate R&D commands.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1978 and Prior Accomplishments: Provided resources incident to management-type functions performed by DARCOM Headquarters and R&D directorates in subordinate DARCOM commands under PE 6.58.01.A, Programwide Activities. These estimated costs have been identified for comparative costs in this submission.

2. FY 1979, FY 1980, and FY 1981 Planned Programs: The FY 1979, FY 1980, and FY 1981 requests represent full support of authorized civilians as currently identified for operation of the R&D Command Headquarters as indicated below. Programing indicates civilian salaries and all related costs (personnel benefits, travel, supplies, and equipment). Variance between fiscal years is due to personnel turbulence (mission and function transfers, relocations, and reassignments) associated with the AMARC realignment.

Program Element: #6.58.98.A
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	FY 1978	FY 1979	FY 1980	FY 1981	Additional to Completion	Total Estimated Cost
Armament Research & Development (R&D) Command	2316	5800	5300	5400	Continuing	Not Applicable
Aviation R&D Command	1530	1600	1600	1700	Continuing	Not Applicable
Communications R&D Command	1558	3500	3300	3400	Continuing	Not Applicable
Electronics R&D Command	2037	5100	4600	4700	Continuing	Not Applicable
Missile R&D Command	2216	3300	3300	3400	Continuing	Not Applicable
Tank Automotive R&D Command	1847	2300	2300	2400	Continuing	Not Applicable
DARCOM Headquarters	4173	4750	4714	4714	Continuing	Not Applicable
TOTAL	16058	26350	25114	25714		

3. Program to Completion: This is a continuing program.